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ON THE STUDY OF DISPLACEMENTS WITHIN A POPULATION

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I

Vital statistics have made rapid progress in the recent decenniums. It may be somewhat difficult for an outsider to realize this great change, but a study of the history of statistics will show it to be an indisputable fact. The progress may seem slight because the founders of political arithmetic and several generations of their disciples often anticipated results which the more scrupulous statisticians of the day have had great difficulty in proving. In fact, the modern statisticians are very careful with regard to methods as well as observations. They wish to be quite sure of the results they publish. Many of the apparent riches which the pioneers have left us and which in former days met with common assent, will be laid aside on account of their lack of real foundation. The conclusions reached by conscientious statisticians of today will, as a rule, stand the test of very severe criticism.

To characterize the present condition of statistics I shall mention two points of great importance. One is the great technical progress of which Mr. John Koren's *Collection of Memoirs of the History of Statistics*, published by the American Statistical Association, bears evidence. Undoubtedly, numerical observations nowadays are, as a rule, much more trustworthy than in former times and, moreover, we are able to specify them to a much larger extent. The second point is the constant effort to improve methods. Taking mortality statistics as an instance, it may be maintained that this discipline has reached a point of relative perfection, new methods for the construction of life tables having been devised and old methods having been improved. To a certain degree

the same will hold good with regard to birth statistics which in several countries show a remarkable evolution.*

But in the history of science it will always be observed that whenever a problem has been solved, new questions will appear on the horizon. Even in the chapter of mortality there is a multitude of unsettled questions, for instance, with regard to heredity. And in close connection with mortality statistics we meet the problems of invalidity and infirmity. Again, there is the criminal man: we need statistical investigations concerning individuals who somehow or other have had a conflict with law. Further, a most important problem is that of migration, not to speak of the transition from one class of society to another, or of changes with regard to confession or conjugal condition.

These questions will generally require fresh observations. Thus a study of heredity will require numerous data from pedigrees and other sources. But at the same time it is worth while to ask whether the old material has always been exhausted, or whether an old census report may under certain circumstances give fresh output, just as a gold mine which has been given up for years often will pay if new technical methods are applied.

Of course even the most modern census will present numerous imperfections. It is sufficient to mention the ages distribution with its maximums at the round years of age, as 20, 30, etc. But usually there will be no insurmountable difficulty in mastering these imperfections so that sufficiently safe conclusions can be drawn. Some simple process of smoothing will, for instance, often be sufficient to do away with the disturbing effect of the irregular distribution according to age.

II

In order to have a point of departure for the present investigation, let us ask whether it is possible to calculate marriage rates from the distribution of the population according to conjugal condition.

A population with its constantly varying elements may be looked upon as a function with three dimensions. At a given moment t there will be a certain number of persons aged x. If ϵ is an infinitely small element of time, then the number of persons between the ages x and $x+\epsilon$ may be representedby $y=\epsilon p_{x,t}$. The value of y will be constantly

* In one of the last numbers of the *Journal of the Royal Statistical Society*, Dr. T. H. C. Stevenson has published an investigation based on the English Census of 1911, on the "Fertility of Various Social Classes in England and Wales," giving most interesting contributions to this chapter of vital statistics. I may be pardoned for quoting an investigation with a similar object, which I published in 1890 in coöperation with Mr. Rubin, dealing with results of the Census of 1880 in Copenhagen. (*Aegteskabsstatistik*, Copenhagen 1890, translated into German under the title: *Statistik der Ehen.*) Later on the Danish Statistical Department has treated the same question in official publications, giving more recent observations for the whole country. Denmark can thus claim priority with regard to this problem.

varying on account of migrations, mortality, and births. It will, for instance, increase, say one per cent a year; its dependence on x will be still more striking, with a conspicuous decrease for each year that is added to the age. Now let the time t and the age x get the same addition ϵ; what influence will these changes have on the number of persons? The bulk of the group will evidently remain unchanged in the short interval of time, but migration and death combined may cause some small change, generally a decrease. Let δ_x be the rate of decrease from these causes, corresponding to the force of mortality; then we shall have:

$$p_{x+\epsilon,\, t+\epsilon} = p_{x,\, t}^{\,1}(1-\epsilon\delta_x),$$

or

$$\frac{dp_{x,\, t}}{dx} + \frac{dp_{x,\, t}}{dt} = -p_{x,t}\delta_x.$$

Of course δ_x is dependent not only on the age, x, but also on the time, t, though in many cases we may be entitled to look upon this quantity as constant in the interval between two censuses.

Let, further, $\epsilon b_{x,\, t}$ be the number of bachelors aged x to $x+\epsilon$; then supposing their rate of migration and death to be δ'_x and the rate of marriage to be m_x, we shall have:

$$b_{x+\epsilon,\, t+\epsilon} = b_{x,\, t}(1-(\delta'_x+m_x)\epsilon),$$

or

$$\frac{db_{x,\, t}}{dx} + \frac{db_{x,\, t}}{dt} = -b_{x,\, t}(\delta'_x+m_x).$$

Finally, we can put $f_{x,\, t} = \dfrac{b_{x,\, t}}{p_{x,\, t}}$, $f_{x,\, t}$ being the ratio between the number of bachelors and the total population. We get the following equation:

$$\frac{df_{x,\, t}}{dx} + \frac{df_{x,\, t}}{dt} = -f_{x,\, t}(\delta'_x - \delta_x + m_x).$$

As a rule it will not be difficult to calculate the expression on the left side of the equation with sufficient approximation. On the right side of the equation we have three unknown quantities, and the value δ_x is actually a sum of two quantities, say i_x the rate of migration and μ_x the force of mortality and the like, then we shall have $\delta'_x = i'_x + \mu'_x$. There are consequently as many as five quantities, and it might therefore be hopeless to try to find the marriage rate for bachelors. Nevertheless, in this case we are not prevented from reaching an approximate result. Usually bachelors will have a greater rate of mortality than married people, and the rate of migration will probably be greater also.

We shall thus very often have $\delta'_x > \delta_x$, and leaving these quantities out of consideration, we get a value for m_x, which as a rule is too high. But the difference between this value and the real one will generally be small. In the period of life in which most marriages take place, the rate of marriage will be 10 per cent or more, whereas the force of mortality and probably often the rate of migration, also, will be only a few per mille. If this is the case, the difference $\delta'_x - \delta_x$ cannot as a rule count much, and we will therefore often be justified in putting as a first approximation:

$$m_x = -\frac{1}{f_{x,t}}\left(\frac{df_{x,t}}{dx} + \frac{df_{x,t}}{dt}\right).$$

That is to say, if we know only the relative number of bachelors according to the census reports, we are able to find their marriage rate without knowing the number of marriages taking place.

In many cases it will even be justifiable to simplify the above equation still more by omitting $\frac{df_{x,t}}{dt}$. This may be necessary, if there is only one census available, or if the observations in the various census reports are not homogeneous. To see the extent of these changes in modern times we may look at the following table for Denmark, 1901 and 1911, giving the proportionate number (per 1,000) of bachelors and spinsters at different ages:

	Males		Females	
Age	*1901*	*1911*	*1901*	*1911*
20–25	881	876	746	727
25–30	497	488	418	400
30–35	246	235	252	254
35–40	151	145	191	194
40–45	106	115	156	173
45–50	89	96	135	155
50–55	77	85	127	138

If these numbers were constant from one census to another, they would tell us how a generation of bachelors or spinsters, if they were not exposed to mortality or migration, would by and by be reduced by marriage, and one census would be sufficient to calculate the approximate values of the rates of marriage. Evidently there is, however, a movement testifying to an increasing frequency of early marriages and a decreasing frequency of marriage in advanced years. From the numbers above we should find for males 20–25 years old with the year as unity:

$$-\frac{1}{f_{x,t}} \cdot \frac{df_{x,t}}{dt} = 0.0006.$$

In the following quinquennium of age we get 0.0018; the values are larger in the more advanced years, and on the whole more considerable for women than for men.

Still, these quantities are small compared to the variations with regard to the age x. The decrease from one quinquennium of age to another is so great that it will be necessary to take some care in the calculations. It may be advisable to go back to the values of $b_{x,t}$ and $p_{x,t}$, calculating their variations separately. As to the unit, it will generally suffice to calculate the relative numbers of bachelors for each year of age, and to use these numbers as approximate expression for $f_{x,t}$ for the median age, for instance 22, 5, 23, 5, etc. It will be advisable to let the numbers undergo some light smoothing process before calculating the rates of marriage. We thus reach the following results:

	Calculated Rates 1911		Observed Rates 1911–15	
Age	*Males*	*Females*	*Males*	*Females*
17.5	....	0.019	....	0.016
22.5	0.069	0.110	0.063	0.103
27.5	0.149	0.113	0.156	0.119
32.5	0.135	0.078	0.127	0.063
37.5	0.073	0.029	0.080	0.033
42.5	0.032	0.019	0.041	0.017
47.5	0.019	.....	0.024	0.009
52.5	0.020	0.010	0.012	0.004

In comparing the results of the calculation with the observed numbers, we must bear in mind that the two columns do not cover exactly the same ground, one of them giving the rates at the moment of the census only (1 Feb. 1911), the other one giving the average 1911–15. Moreover, the observed rates are calculated for the ages 20–25, 25–30, etc., not for single years of age: finally, the various stages of calculation (including the variations with regard to t), as well as the whole smoothing process, may give rise to some difference. We must remember, as remarked above, that there is reason to consider the rates that have been found in this way as somewhat too high, the difference $\delta'_x - \delta_x$ having been left out of consideration. If we calculate the number of marriages which would take place in a population like that of 1911, according to the calculated and the observed rates, the former will give 4 per cent more marriages among men than the latter, and about 5 per cent more marriages among women. If we had no knowledge from direct observation, of the rate of marriage of bachelors, we might be justified in looking upon these calculated rates as a rather fair approximation. In some countries rates of marriage for the whole population are known, but not for widowers and bachelors separately. The

described method would then help us to draw conclusions with regard to the rates of marriage for widowers as well as for bachelors.

It might be objected that all these calculations are superfluous if we are possessed of satisfactory direct observations, and that we have only to collect such observations in order to find the rates we wish to know. But this cannot always be the case. For example, we are in possession of a very interesting old Danish census of 1787, but we have no corresponding knowledge of the marriages, so that if we wish to form a picture of the chances of marriage of those days we shall have to resort to devices of the described character.

This census of 1787 is in many respects a most remarkable document; it gives—with 10 year intervals of age—the combined distribution of population according to sex, conjugal condition, and occupation. The numbers reveal the most striking difference between the old society and the modern one. Thus in the age of 30–40 among 100 males, no less than 29 were bachelors in 1787 as against 19 in 1911. In the following 10 year group there was a difference in the opposite direction, 9 against 12, and among females the difference was still greater, the corresponding numbers being 9 and 16.

These enormous changes are, however, chiefly a modern product. In 1801 the relative number in the age of 20–30 was 80 for males, the same as in 1787; for females the number was reduced from 64 to 63. In the following age-group the numbers were unchanged. Thus, in order to find the rates of marriage it will be justifiable to leave the variations with regard to time out of consideration.

The rates of marriage have been found for the median ages 25, 35, etc., by supposing the number of bachelors as well as the total number of persons to be represented by algebraic functions. Putting $b_x = m + nx + px^2$, we find, the central age being 0,

$$a = \int_{-15}^{-5} (m+nx+px^2)dx,\ b = \int_{-5}^{+5} (m+nx+px^2)dx$$

and

$$c = \int_{+5}^{+15} (m+nx+px^2)dx$$

where a, b, c, are three consecutive observed numbers of bachelors, and it is then easy to find m, n, and p; the differential coefficient of b_x for $x=0$ will be n. In the same way we can deal with the total numbers A, B, and C, and we find as an approximate value of the marriage rate:

$$\frac{6}{5}\left(\frac{C-A}{26B-A-C} - \frac{c-a}{26b-a-c}\right);$$

or we may choose a still simpler formula on the supposition that we can put $2b=a+c$ and $2B=A+C$: the formula will then be reduced to

$$\frac{C-A}{20B}-\frac{c-a}{20b}.$$

In this way the following approximate values of the rates of marriage per mille in 1787 have been found:

Age	*Males*	*Females*
25	39	53
35	138	185
45	132	92

The numbers show a striking contrast to the rates for 1911–15, given above. In the younger years there were proportionally few marriages, but after 30 the opposite is true.

To understand these enormous differences it will suffice to consider certain observations in various classes of society. For instance, we find among craftsmen in the town population the following absolute numbers:

	Masters		Journeymen	
Age	*Married and Widowers*	*Bachelors*	*Married and Widowers*	*Bachelors*
20–30	511	302	321	3,578
30–40	1,748	173	674	876
40–50	1,589	88	397	187
50–60	1,153	56	233	68

Taking masters and journeymen together we find that in the age of 20–30 years about 82 per cent were unmarried; in the following age group the number is only 30 per cent, between 40 and 50 it has been reduced to 12, and between 50 and 60 to 8. The married people were to be found chiefly among the masters. Thus, whereas 57 per cent of the journeymen between 30 and 40 were bachelors, the corresponding number among masters was only 9 per cent. It appears, further, from these observations that there was a constant stream from the class of journeymen to that of masters, but many journeymen reached the position of independent householders very late in life, and consequently marriage had to be put off. In most professions the journeyman lived in his employer's house, as a member of his household, till he settled as master. It is quite otherwise in modern society; most workingmen have no chance of becoming employers, so that they have very little inducement to put off marriage. It may even be the case that a young workingman aged 20 or 25 is frequently better off than he is in more advanced years.

III

Returning to the equation:

$$\frac{df_{x,t}}{dx}+\frac{df_{x,t}}{dt}=-f_{x,t}(\delta'_x-\delta_x+m_x),$$

we can use $f_{x,t}$ to signify other groups within the population. In the parenthesis, m_x will be the frequency of cases which tend to diminish the group, being negative, if there is an increase of the number. As with the marriages there will sometimes be the simplification that the variation with regard to t can be considered as zero, so that $\frac{df_{x,t}}{dt}$ can be left out of consideration. As an instance we can choose the feeble-minded. Under this heading the Danish census chiefly registers persons who are feeble-minded from birth or from a very early age. It is a mere exception that persons registered as feeble-minded are married. If the feeble-mindedness had often appeared later in life, the number of married persons in this group would undoubtedly be much larger. Thus m_x will probably be zero or at least very low (being an increase to the group, it will not be positive as the marriage rate). The variations of $f_{x,t}$ with regard to t will probably also be very small, though the census reports seem to indicate the reverse; the explanation seems to be that previous census reports have been less successful in the enumeration of the feeble-minded than was the census of 1911. Probably migration plays only a trifling part among idiots. In the parenthesis therefore we have chiefly to consider $\mu'_x-\mu_x-i_x$, μ'_x being the force of mortality among feeble-minded and μ_x among all persons, i_x the rate of migration. If fresh cases have a noteworthy effect, we shall have to add the negative quantity m_x. In the following table are shown the numbers of feeble-minded in Denmark, observed in 1911, among 10,000 of each age and sex, the numbers being adjusted by taking the average of three values as expression for the median:

FEEBLE-MINDEDNESS IN DENMARK, 1911

Age	*Males*	*Females*
15–20	29.3	25.3
20–25	28.1	22.7
25–30	26.1	20.5
30–35	24.0	19.7
35–40	21.4	17.8
40–45	19.2	16.4
45–50	17.0	13.1
50–55	14.7	11.4
55–60	13.1	10.3
60–65	11.9	9.4
65–70	9.3	8.0

The yearly decrement in the age 20–25 would be about $1/10(29.3-26.1)=0.32$. Dividing by 28.1 we find a quotient 0.011. The normal rate of mortality being 0.004, the mortality of feeble-minded will be at least 0.015. In this way the following table has been calculated:

RATE OF MORTALITY PER 1,000

	IDIOTS		NORMAL PERSONS	
Age	*Males*	*Females*	*Males*	*Females*
20–25	15	25	4	4
25–30	20	19	4	4
30–35	25	19	5	5
35–40	28	25	6	6
40–45	30	35	7	6
45–50	36	46	10	8
50–55	40	35	13	10
55–60	40	33	19	14
60–65	59	45	27	21

These numbers can of course give only very rough estimates, but we can hardly read them otherwise than as testifying to a very high mortality among idiots. I may here refer to an investigation which I made several years ago concerning the mortality of idiots in asylums for feeble-minded, thus probably singling out a group still more delicate in health.* I found a mortality which was on an average nearly double the rates stated above; this seems to corroborate the results from the method here explained.

Turning to the insane, we find particulars of the same kind in the Danish census reports. In the following table are given the unadjusted numbers per 10,000 according to the census of 1911:

INSANE PERSONS

Age	*Males*	*Females*
15–20	1.9	2.3
20–25	9.4	9.3
25–30	20.6	16.6
30–35	27.7	22.4
35–40	32.8	35.6
40–45	40.3	40.7
45–50	38.7	53.5
50–55	43.8	53.1
55–60	44.0	57.4
60–65	46.7	51.8
65–70	48.9	58.5
70–75	46.1	47.3

It follows from these numbers that in a long period of life there is a constant increase of lunatics, in spite of the recoveries and in spite of

* *Die Lehre von der Mortalität und Morbilität*, 2te ed., 1901, p. 237.

their undoubtedly high mortality. Thus between 20 and 25 we find for males a yearly net increase of about 20 per cent of the existing number. If we prefer to ask what is the probability of a young man's becoming insane at the age 20–25, we shall have to compare these fresh cases to the number of non-lunatic men, viz., 9,991, and the lower limit of the probability of becoming insane within a year will be 0.2 per mille. But in this case the excess of mortality and the frequency of recovery will play such an important part that it is less satisfying to follow the described line of thought with regard to this material.

With regard to the blind and the deaf and dumb, the Danish census of 1911 gives the following numbers per 10,000:

	Blind		Deaf and Dumb	
Age	*Males*	*Females*	*Males*	*Females*
Under 5 years	1.2	1.1	1.4	1.3
5–10	1.9	1.8	4.8	3.6
10–15	3.5	3.0	7.2	8.0
15–20	3.1	2.5	9.0	5.7
20–25	3.2	2.0	7.4	6.2
25–30	2.5	2.8	9.8	7.0
30–35	3.6	3.0	8.7	6.1
35–40	3.2	4.0	14.5	9.3
40–45	4.1	4.7	8.3	6.8
45–50	6.1	4.8	7.5	6.4
50–55	8.3	6.7	8.3	5.0
55–60	10.3	8.0	7.1	7.3
60–65	12.2	9.6	9.0	6.6
65–70	16.2	17.2	9.2	7.7
70–75	20.3	22.4	5.9	5.9

The numbers of deaf and dumb depend to some extent on epidemics. Thus in Denmark the abnormal numbers between 35–40 in the year 1911 can partially be ascribed to epidemics from meningitis cerebrospinalis in Jutland, 1872–73.* Leaving out this group we find on inspection of the relative numbers that the frequency of this defect in the ages 15–35 is about the same as between 40 and 70. On the whole there seems to be no striking difference between the mortality of the deaf and dumb and of the general population. This was confirmed by a direct investigation by Dr. Mygind several years ago.†

The numbers concerning the blind are more complicated. The function $f_{x,t}$ cannot be looked upon as constant with regard to t, for there has been a conspicuous decrease in the blindness of newly-born owing to hygienic and medical progress. Thus the relative numbers in advanced years would be larger than if the present chances of the blind were used. In the equation

* Westergaard, *loc. cit.*, p. 239.

† *Nationalökonomisk Tidsskrift*, 29, vol. 1891.

$$\frac{df_{x,t}}{dx}+\frac{df_{x,t}}{dt}=-f_{x,t}(\mu'_x+i'_x-\mu_x-i_x+m_x)$$

we may be entitled to leave $\mu'_x+i'_x-\mu_x-i_x$ out of consideration. The negative quantity m_x will thus mainly depend on the chances of becoming blind, as there is a very small chance for a blind person to recover; if we take no notice of the variations with regard to t, we shall somewhat exaggerate the probability. After 15 the frequency of blindness is nearly constant for a long series of years, but at about the age of 40 an increase is beginning. We find, for instance, that out of 100,000 the following numbers would yearly become blind:

Age	*Males*	*Females*
55–60	4	8
60–65	6	10
65–70	8	17

There is, therefore, an increasing probability with increasing age, and the female sex appears much more liable to blindness than the male.

It is unfortunately not possible to find the variations with regard to t, as the previous census report is not sufficiently complete with regard to the cases of blindness. But there is reason to believe that this imperfection of the material has comparatively slight influence on the numbers concerning the more advanced years of age which have been treated here.

Incomplete as all these observations on infirmity and invalidity are, they may serve as examples of the method explained, showing various possibilities under the discussion of the equation rendering the variations of the relative numbers.

IV

When two consecutive census reports are fairly correct, it may often be sufficient, instead of calculating the probabilities, merely to study the variations in the relative numbers. This will hold good with regard to the Danish religious statistics. The census registers the number of adherents to each church. The bulk of population is registered as belonging to the established (Lutheran) church, only small minorities belonging to other confessions. There is reason to believe that these minor groups have very much the same mortality as the total population, and that also the migrations with few exceptions (viz., the Jews and possibly also the Roman Catholics) are mostly of the same character. We are thus entitled to expect that the value of f_x in 1901 will be the same as that of f_{x+10} in 1911, if there are no particular movements influencing the numbers. Thus among Baptists we find in 1901, 455 males registered, aged 35–50 years. Ten years later there

were 406, aged 45–60. In the whole population the corresponding numbers were 189,891 and 169,512. Out of 1,000 persons in 1901 there were 893 left in 1911. Calculating 993 per mille of the observed number of Baptists in 1901, we find 406, which is exactly the number observed in 1911. It thus seems probable that very little change has taken place in Denmark in this church in the ages concerned. In the following, I shall give some observations of this kind:

REFORMED CHURCH

1901			1911				
Age	*Males*	*Females*	*Age*	*Males*		*Females*	
				Observed	*Expected*	*Observed*	*Expected*
5–15	99	89	15–25	89	88	104	84
15–20	55	47	25–30	47	46	61	44
20–35	115	122	30–45	113	108	122	114
35–50	98	125	45–60	85	87	102	113
50–80	131	131	60–70	66	82	83	87
	498	514		400	411	472	442

The difference between the observed and expected numbers is not very striking. The Reformed Church has, on the whole, kept its members.

The Methodists also show rather small changes, as will appear from the following numbers:

METHODISTS

1901			1911				
Age	*Males*	*Females*	*Age*	*Males*		*Females*	
				Observed	*Expected*	*Observed*	*Expected*
5–15	468	482	15–25	270	415	427	457
15–20	125	178	25–30	106	104	170	166
20–35	258	443	30–45	250	240	449	414
35–50	329	451	45–60	277	293	430	409
50–80	254	392	60–70	210	159	293	260
	1,434	1,946		1,143	1,211	1,769	1,706

There seems to be some decrease in younger years, whereas in riper age the numbers are somewhat increasing.

Also, the Baptists show some stability between the two census years; in younger years, however, some decrease is perceptible.

BAPTISTS

1901			1911				
Age	*Males*	*Females*	*Age*	*Males*		*Females*	
				Observed	*Expected*	*Observed*	*Expected*
5–15	575	647	15–25	349	509	479	613
15–20	178	235	25–30	136	148	195	219
20–35	419	615	30–45	403	391	605	574
35–50	455	564	45–60	406	406	537	512
50–80	479	654	60–70	323	300	396	434
	2,106	2,715		1,617	1,754	2,212	2,352

Compared to these results several other churches show great variations, for instance, the Catholic-Apostolic Church (the "Irvingites").

"IRVINGITES"

1901			1911				
Age	*Males*	*Females*	*Age*	*Males*		*Females*	
				Observed	*Expected*	*Observed*	*Expected*
5–15	479	486	15–25	201	424	254	461
15–20	154	193	25–30	70	128	115	180
20–35	293	429	30–45	193	273	268	401
35–50	317	392	45–60	193	283	272	356
50–80	350	318	60–90	149	157	171	211
	1,493	1,818		806	1,265	1,080	1,609

The loss is perceptible in all periods of age, but especially in younger years. On the other hand, the Roman Catholic Church has made rapid progress, as the following numbers will prove:

ROMAN CATHOLIC CHURCH

1901			1911				
Age	*Males*	*Females*	*Age*	*Males*		*Females*	
				Observed	*Expected*	*Observed*	*Expected*
5–15	552	623	15–25	1,239	489	1,265	591
15–20	228	242	25–30	469	189	516	225
20–35	591	769	30–45	890	551	1,094	718
35–50	488	630	45–60	465	435	624	571
50–80	282	387	60–90	193	177	272	257
	2,141	2,651		3,256	1,841	3,771	2,362

Also here we see that the increase takes place principally in the younger years. Part of the increase is probably caused by Polish agricultural laborers coming to Denmark for a shorter or longer time.

The Jews show interesting phenomena. The small mosaic congregation in Denmark seemed for a couple of generations to be in stagnation, or even to be gradually dying out. But of late years there has been an afflux from abroad, especially from Poland and Russia. This accounts for the peculiar changes in the age distribution which can be observed. In 1901 only 18 per cent of the total number were under 15, but in 1911 the proportion had risen to 26 per cent. In the same way as above the following results have been found:

JEWISH CONFESSION

1901			1911				
Age	*Males*	*Females*	*Age*	*Males*		*Females*	
				Observed	*Expected*	*Observed*	*Expected*
5–15	215	220	15–25	379	190	448	209
15–20	124	115	25–30	253	103	241	107
20–35	364	411	30–45	512	339	533	384
35–50	389	408	45–60	362	347	416	370
50–80	412	516	60–90	239	258	351	342
	1,504	1,670		1,745	1,237	1,989	1,412

The increase is very conspicuous in the younger years; in more advanced ages foreign Jews have evidently not settled in Denmark to any extent in the period which we have here before us.

Finally, I shall give the main results with regard to persons who have been registered as not belonging to any confession. The number has been rapidly increasing, though it is still very small compared to the total population. The motive for declaring withdrawal from the established church or other confessions may of course lie deep within the personality; but very often some outward event will be taken as occasion, for instance, the wish to enter into civil marriage. The total number increased from 3,628 to 8,151, in 1911.

BELONGING TO NO CHURCH

1901			1911				
Age	*Males*	*Females*	*Age*	*Males*		*Females*	
				Observed	*Expected*	*Observed*	*Expected*
5–15	231	178	15–25	757	205	353	169
15–20	119	63	25–30	1,149	99	270	59
20–35	1,087	327	30–45	2,347	1,013	566	305
35–50	778	212	45–60	709	694	228	192
50–80	251	97	60–90	169	154	67	64
	2,466	877		5,131	2,165	1,484	789

After the age of 45 there is no great change, whereas in younger years the increase is appreciable, especially among males aged 25–30, the number rising from 99 to 1,149.

It is not difficult to find approximate net values of the rates of withdrawal from the church. Let $b_{x,t}$ be the number of persons outside the church, and $p_{x,t}$ the number belonging to some confession, and let the rate of withdrawals over and above the rate of reëntrance be $w_{x,t}$, then in a given element of time ϵ, the number of withdrawals will be $w_{x,t}p_{x,t}\epsilon$. If a census has been taken at 10-year intervals, the first census giving $p_{x,t}$, the latter $p_{x+10,t+10}$, and if the time passed is $t+n$, then we shall have as the expected number of withdrawals: $w_{x+n,t+n}$ $p_{x+n,t+n}\epsilon$. Of these persons some will disappear in the period preceding the next census. It may be supposed that $p_{x+n,t+n}$ will be reduced to $p_{x+10,t+10}$ and the total gain found at this moment will be

$$p_{x+10,t+10}\int_0^{10} w_{x+n,t+n}dn,$$

or approximately

$$10 \cdot p_{x+10,t+10} \cdot w_{x+5,t+5}.$$

As an example we can take the gain in 1911 for males aged 25–30, altogether 1,050 or 105 per year between 1901 and 1911. The rate of withdrawals for the ages 20–25 will then be approximately 0.0011, the number of males aged 25–30 being in 1911 about 99,000, of whom

98,000 belonged to some confession. At the age of 15 we shall find 0.0002; for 30–35 years we shall have 0.0006. Above 40 the rate of withdrawals is reduced to a very small value, the excess being, according to the table, only 0.00001 per year.

V

Returning to the old Danish census of 1787, we may ask what displacement according to this census took place from one class of society to another. Practically, as remarked above, we may at this epoch look upon the population as being stable, the same proportions remaining from one year to another, even though there has been a small yearly natural increase of the population. Let $f_{x,t}$ be the relative proportion of some class to the whole population, then we may suppose that the differential coefficient $\frac{df_{x,t}}{dt}$ is approximately zero. Thus, the rural population had nearly the same proportion to the town population as 14 years later. By the census of 1901 the rural districts had, as in 1787, a population about four times the urban one, the urban population, as in the early census, being equally distributed between the capital and the provincial towns.

We may now ascertain to what extent the attraction of the towns has acted upon the population by using a similar reasoning as above with regard to the confession. For 1,000 males in the whole country aged 20–30 we should find 859 aged 30–40. Consequently the number of males in Copenhagen aged 20–30 would be reduced from 10,952 to 9,408 in the following decade, if there were no peculiar causes influencing the numbers. The actual number being 8,792, there is a difference of 616, probably owing to migrations in the age between 20–30 to 30–40, say about 30 years of age. For 100 persons expected, there were actually found only 93. In this way the following table has been calculated, showing how many persons were observed for 100 expected:

	Males			Females		
Age	*Copenhagen*	*Provincial Towns*	*Rural Districts*	*Copenhagen*	*Provincial Towns*	*Rural Districts*
10-20	107	98	99	96	96	101
20-30	170	122	90	152	129	92
30-40	93	96	102	100	96	101
40-50	78	92	105	85	98	103
50-60	82	95	103	90	102	101
60-70	71	89	104	88	102	101
Above 70	89	100	101	88	107	100

Thus, town life had a considerable attraction on males in younger years, more than counterbalancing the higher mortality which then as a

rule menaced the life in towns. But soon after the tide turns and, as the combined effect of the greater mortality and of the migrations, the numbers are smaller in advanced years of age in Copenhagen and the provincial towns than in the country. At about 20 the male Copenhagen population had an increase of about 4 per cent per year from migration, whereas the rural districts were losing only 1 per cent. Also, the female population was attracted in younger years by the towns, the reaction being perceptible in the age of 30–40.

Still more interesting were the changes which took place within the artisan class. Only a few professions were allowed in the country, such as weavers, blacksmiths and wheelwrights, the towns having the privilege of binding most professions to them. The village artisans in the census report are given in total, whereas the artisans in towns are divided into two classes, the masters (with their male children), and the journeymen and apprentices.

The following table gives the main observations in absolute numbers for males:

	Towns			Rural Districts
Age	*Masters*	*Journeymen*	*Total*	*Total*
0–10	3,391	951	4,342	6,988
10–20	1,119	3,060	4,179	2,603
20–30	813	3,899	4,712	3,232
30–40	1,921	1,550	3,471	4,184
40–50	1,677	584	2,261	3,449
50–60	1,209	301	1,510	2,748
60–70	640	144	784	1,543
70–80	188	40	228	472
80–90	26	9	35	69
90–100	2	....	2	....
	10,986	10,538	21,524	25,288

It will be seen on inspection of this table that the ranks of the village artisans are very much reduced in a certain period of life; among 10 and 20, probably a large number of this group gained their living as servants, later returning to their profession. Some village artisans have possibly spent some time in the towns.

We can now try the same calculation as above for the towns and the rural districts, and we thus arrive at the following results, showing what percentage of the expected numbers was actually found in the various groups of age:

	Towns			Villages	Total of Artisans
Age	*Masters*	*Journeymen*	*All Artisans*		
10–30	54	181	123	76	99
30–50	159	39	84	124	103
50–100	90	75	86	96	92

As observed above, the country has a loss in the first period of life and a gain in the later period. On the other hand the towns gain in the younger years but lose afterwards. From material so defective as this it will, of course, be impossible to trace all the causes. Part of the loss in the higher ages in towns may be due to the unfavorable mortality; also, a number of former artisans may possibly be found in poorhouses.

We might have tried other methods of comparison. For example, it would be tempting to calculate the numbers which would be found if all the classes in view had the same age-distribution, taking as basis the number in each class pertaining to the youngest group of age. But the picture seems to be clearer if we choose the comparison which has been explained here.

The numbers of masters and journeymen show interesting features, as was remarked above, the stream going from the journeymen to the masters. For the sake of brevity I shall, however, omit entering into more details with regard to this question. But some observations concerning the structure of the rural population may prove instructive.

This structure of village society was at that time very simple. The majority of the population (altogether 330,000 males) were peasants (tenants and freeholders) with cottiers, servants, and laborers. About 135,000 males of all ages were registered as peasants with their children, holding lands of various size, sufficient to support a family; 35,000 were small-holders and 6,000 were registered as cottiers without land, working for the peasants or in the manors. There were 26,000 laborers, some of whom probably were engaged in work other than agricultural; this has been the case, too, with some of the 67,000 male servants. About 7,000 male persons were registered as poor. The following table will show the distribution according to ages:

MALES IN RURAL DISTRICTS 1787

Age	*Peasants*	*Small-Holders*	*Cottiers*	*Servants*	*Laborers*	*Poor*	*The Six Classes Combined*
0–10	38,936	11,059	2,142	2,479	8,250	1,822	64,688
10–20	22,545	2,229	408	25,683	1,717	501	53,083
20–30	15,089	2,011	461	25,380	1,417	176	44,534
30–40	17,869	5,163	741	8,355	4,005	233	36,366
40–50	16,863	5,613	556	2,867	4,407	349	30,655
50–60	12,347	4,684	599	1,299	3,691	697	23,317
60–70	7,767	3,074	779	466	2,046	1,442	15,574
70–80	3,106	1,157	428	94	432	1,458	6,675
80–90	491	154	84	7	21	393	1,150
90–100	16	5	7	....	2	39	69
	135,029	35,149	6,205	66,630	25,988	7,110	276,111

It will easily be seen, on inspection of this table, how people floated from one group to another, for instance, swelling the class of servants between age 10 and 30 and diminishing the number of peasants, and still more that of laborers. If we calculate the expected numbers according to the age-distribution in the whole country, we obtain the following results:

EXPECTED NUMBERS

Age	*Peasants*	*Small-Holders*	*Cottiers*	*Servants*	*Laborers*	*Poor*	*The Six Classes Combined*
10–20	29,046	8,250	1,598	1,849	6,155	1,359	48,257
20–30	21,553	2,130	390	24,553	1,641	479	50,746
30–40	12,961	1,727	396	21,801	1,217	151	38,253
40–50	14,438	4,172	599	6,751	3,236	188	29,384
50–60	12,546	4,176	414	2,133	3,279	260	22,808
60–70	7,766	2,946	377	817	2,322	438	14,666
Above 70	3,726	1,259	396	205	907	863	7,556
	102,036	24,660	4,170	58,109	18,757	3,738	211,670

In the age of 10–20, the peasants have lost about one-fourth of their number, but the small-holders have lost nearly three-fourths, being reduced from 8,250 as expected, to 2,229 as observed. This is also the case with the landless working men (the cottiers and the laborers); also from the poor there is a constant stream, probably chiefly going to the class of servants. The five classes here mentioned have lost about 19,000, whereas the class of servants has gained nearly 24,000. Probably the ranks of the servants were also recruited from other classes, as that of the artisans; even the town population may have contributed a little.

In the following decennial age group (20–30), a loss is perceptible if all the six classes are taken together, whereas the class of servants has still a small increase. There is a considerable decrease in the peasant class, probably partly owing to the military service, the class of soldiers and sailors in this period of life showing a large addition.

In the next period of life (30–40) tide is turning. Five thousand persons are streaming back to the peasant class, proportionally still more to the small-holders and laborers. Altogether, the class of servants has lost 13,000 or nearly two-thirds of its expected number. There is still a small loss in the six classes, which, however, in the following period of life changes into a small increase.

The age of 40–50 shows in the main the same features as the foregoing one—the servants losing more than half of their number, whereas the other classes are winning. The decrease in the servant class is still perceptible in the following age-groups, but now this class has been so much reduced that its movements can have hardly any influence on

the other classes; thus the number of peasants seems mainly constant. A considerable increase is shown in the poor class. The following abstract will give the main results. It tells what percentage of the expected number was actually found:

Age	*Peasants*	*Small-Holders*	*Cottiers*	*Servants*	*Laborers*	*Poor*	*The Six Classes Combined*
10–30	74	41	44	193	40	37	99
30–50	127	183	130	39	189	172	99
50–100	99	106	160	59	95	258	104

In order not to make this description too fatiguing, I shall confine myself to a corresponding abstract for the female population:

Age	*Peasants*	*Small-Holders*	*Cottiers*	*Servants*	*Laborers*	*Poor*	*The Six Classes Combined*
10–30	78	58	71	187	53	56	100
30–50	114	157	143	26	160	208	96
50–100	96	94	123	53	80	183	103

On the whole we have here the same features as for the male population.

The method used here to follow the movements of the various classes of population can, under certain circumstances, be applied to modern census reports. The well-known English *Supplementary Reports on Births, Deaths, and Marriages* give good information concerning the varying ages distribution in a large number of professions, and it will not be without value to look upon these observations from the point of view here described. As another instance I shall mention an investigation which I undertook many years ago in coöperation with Mr. Rubin; it gave us the opportunity of entering into the same question.*

In order to find the rates of mortality in various classes of the rural population, we undertook a study of the original schedules of the census of 1880 for one of the Danish provinces so that we could ascertain the distribution according to ages of the classes which we wished to investigate. But whereas these observations might be looked upon as fairly correct they were not truly representative without a correction for the corresponding number of deaths. There was reason to believe that several young servants, if attacked by a serious disease, as tuberculosis, left their service and returned to their homes to die there, and if the certificate of death then did not mention the deceased as a servant, the consequence would be that the mortality of the class concerned was overrated. In order to see the extent of this source of errors, it was therefore necessary to correct the numbers as far as possible by

**Landbefolkningens Dödelighed.* Copenhagen, 1886.

supplementing the numbers of living persons and of deaths in each class of society with a probable number originating from the class of servants. Thus, among artisans the mortality between 10 and 15 would be reduced from 3.8 per mille to 3.2 per mille and between 15 and 20 from 4.8 per mille to 4.0 per mille. The ages distribution had much resemblance to the table for 1787, though probably the numbers for 1880 are somewhat less stable.

As to the census report for 1787 it would be easy to multiply applications of the method here explained. Thus, sailors and fishermen form one interesting group, the soldiers another one; but what I have developed here will probably prove sufficient to form an opinion concerning the method.

It must be acknowledged that several of the calculations described above have a less firm character than we should wish for in modern statistics. However, they will have this advantage over the old political arithmetic with its often very fantastic results, that they are supported by observations abounding in thousands of volumes of official statistics all over the world. From this stronghold it may be allowed to make excursions in fields which have not yet come under the plough of regular statistics.

VI

A little nearer the shelter of official statistics we meet the problem of calculating the rates of migration of a population, the rates of mortality having been fixed with tolerable accuracy from the lists of deaths and the census reports. In fact, knowing as we do the number of deaths of a certain generation between two moments of census, we can easily calculate the gain or loss from migration, and thus we have material for calculating the rates of migration according to age.

If the force of mortality at a given age x is μ_x and the rate of the net-emigration is i_x, then we have:

$$\delta_x = \mu_x + i_x$$

where δ_x is found by the equation:

$$p_{x+\epsilon,\, t+\epsilon} - p_{x,\, t} = -\delta_x p_{x,\, t},$$

knowing μ_x, we get i_x by subtraction.

From this equation we get the following:

$$p_{x+10,\, t+10} = p_{x,\, t} \cdot e^{-\int_0^{10} \delta_{x+n}\, dn},$$

or approximately

$$e^{-10\,\delta_{x+5}} = \frac{p_{x+10,\, t+10}}{p_{x,\, t}}.$$

The main results for Denmark for 1900–10 will be the following for males:

Age	*Force of Mortality Per Mille*	*Rate of Net-Emigration Per Mille*
5–10	3	3
10–15	2	5
15–20	3	15
20–25	4	15
25–30	5	4
30–35	5	1

After 45 the rate of migration is very small. It will be seen from these numbers that it is principally the young men who leave their country.

As to the female population between 5 and 25, the yearly excess of emigration over immigration will be about 3 per mille; after this age for a long period of life the rate is reduced to 1 or 2 per mille. The influence of age on migration is thus much less than among males.

THE ABILITY OF EUROPEAN IMMIGRANTS TO SPEAK ENGLISH*

By Louis Bloch

I. INTRODUCTION

The ability to speak English on the part of the foreign-born population of the United States is a matter of paramount importance in connection with the problem of Americanization. In order that the immigrant groups may participate fully in the life and activities of the natives, or even of the older immigrant groups which have already adopted the language of the land as their medium of expression, it is essential that they learn to use the language of this country. It will be shown in the following pages that the necessity of learning to speak English confronts about 90 per cent of the European immigrants who come to the United States and that the problem is one which affects primarily, if not wholly, the first generation of immigrants. The data on ability to speak English in the censuses of 1900 and of 1910 have been analyzed in this article with a view to finding out the status of the foreign-born population in regard to ability to use the English language.

II. SCHOOL ATTENDANCE

It is apparent from the data presented in Table I that the problem of speaking English is almost wholly one affecting the first generation

TABLE I

PERCENTAGE ATTENDING SCHOOL DURING 1909–10, BY AGE OF PERSON ATTENDING (THIRTEENTH CENSUS, VOL. 1, p. 1100.)

Age	Native white			Foreign-born white
	Total	Native parentage	Foreign or mixed parentage	
6 years	55.5	52.6	62.9	55.5
7 years	79.2	77.2	84.3	76.9
8 years	86.7	85.2	90.5	84.2
9 years	89.5	88.3	92.4	87.5
10 years	93.2	92.2	95.7	90.3
11 years	93.8	92.9	96.1	91.4
12 years	93.1	92.0	95.6	90.2
13 years	91.9	90.9	84.3	87.7
14 years	84.7	85.3	83.1	71.6
15 years	71.5	75.0	63.5	46.2
16 years	53.7	58.9	41.8	23.7
17 years	38.0	42.9	26.7	12.2
18 years	25.1	28.6	16.9	6.8
19 years	16.3	18.5	11.1	4.8
20 years	9.8	11.0	6.8	3.0

* This subject is discussed by the writer in greater detail in *Bulletin No. 43* (mimeographed) *of the Division of Information Service of the Carnegie Americanization Study.*

of immigrants. Up to the age of 14 the percentages of native whites of foreign or mixed parentage attending school are higher than those of the native whites of native parentage. The native-born children of foreign-born parents go to school and learn to speak the English language. Above the age of 14 it will be seen that the difference in school attendance is in favor of the native whites of native parentage. Between the ages of 14 and 20 the proportion of the native whites of native parentage attending school ranges from 85.3 to 11.0 per cent as compared with percentages ranging from 83.1 to 6.8 for the native whites of foreign or mixed parentage.

It will be noticed that there is not much difference in school attendance between the foreign-born whites and the natives up to the age of 14, but that beginning with that age the difference is very marked in favor of the native whites. According to the census, "Economic conditions undoubtedly account in part for the lesser frequency of school attendance among the foreign-born of older ages. The fact that the foreign-born are concentrated in cities, where school attendance generally begins and ends at an earlier age than in rural districts, is doubtless also a factor. It should be borne in mind, however, that the pronounced decline in the proportion of school attendance among the foreign-born whites beginning at the age of 14 is not altogether caused by the fact that those in school leave at these ages, but is due in large part to the influx of immigrants of 14 years and over, who never go to school in the United States."*

The data as presented in the census do not reveal the kinds of schools attended by the respective nativity groups or the length of time school was attended. It is safe to assume, however, that only in a very small proportion of schools was the English language not taught and that the average length of time the individual attended school was sufficient to enable him to learn to speak English.

Since it is the native whites of foreign parentage and also the foreign-born whites under 14 years of age who generally attend school, it may be concluded that the problem of learning to speak English, as has already been said above, is one affecting primarily the first generation and largely those who are above the age of thirteen.

III. IMMIGRATION FROM ENGLISH-SPEAKING COUNTRIES

The following table (Table II) shows that 10.6 per cent of all immigrants who arrived from Europe during the decade 1901–10 came from English-speaking countries, which means that only about 90 per cent of the immigrants arriving in the United States are faced with the

* The Thirteenth Census, General Report and Analysis, vol. 1, p. 1101.

problem of learning to speak English. This table does not take into consideration immigrants from countries other than Europe, such as Asia, Mexico, or from the British possessions. But since the data submitted below are confined to the foreign-born whites, and since the numbers arriving from countries other than Europe are comparatively small, the estimate of those unable to speak English upon arrival has been confined to the European immigrants.

TABLE II

NUMBER AND PER CENT OF EUROPEAN IMMIGRANTS WHO ARRIVED IN THE UNITED STATES FROM THE UNITED KINGDOM DURING 1901–10. (COMPUTED FROM U. S. IMMIGRATION COMMISSION STATISTICAL REVIEW OF IMMIGRATION, PP. 93–96.)

	Number	Per cent
Total from Europe	8,136,016	100.0
United Kingdom	865,015	10.6
England	388,017	4.8
Ireland	339,065	4.2
Scotland	120,469	1.5
Wales	17,464	.2

IV. CENSUS DATA ON INABILITY TO SPEAK ENGLISH†

In each of the last four censuses an inquiry as to ability to speak English was included in the population schedule. In taking the census of 1890 the enumerators were instructed to return as English speaking any person 10 years of age and over "able to speak English so as to be understood in ordinary conversation." The following table (Table III) from the Thirteenth Census shows the number and per cent of

TABLE III

NUMBER AND PER CENT OF FOREIGN-BORN WHITES 10 YEARS OF AGE AND OVER UNABLE TO SPEAK ENGLISH, BOTH SEXES, FOR 1890, 1900, AND 1910. (CENSUS, 1910, VOL. 1, P. 1268.)

Census year	Foreign-born whites 10 years of age and over		
	Total	Unable to speak English	
		Number	Per cent
1910	12,944,529	2,953,011	22.8
1900	10,014,256	1,217,280	12.2
1890	8,786,887	1,371,044	15.6
Increase (or decrease)			
1900–10	2,930,273	1,735,731	142.6
1890–00	1,227,369	—153,764	—11.2

† It is important in studying the statistics of ability to speak English to bear in mind the distinction between the ratio of non-English speaking to the total foreign-born population and the ratio of non-English speaking to the total number of foreign-born of non-English-speaking races. The latter proportion

foreign-born whites unable to speak English at each of the three preceding censuses.

It appears from this table that the number unable to speak English more than doubled from 1900 to 1910 and that the number unable to speak English in 1890 was greater than the number reported unable to speak English in 1900. The Thirteenth Census makes the following comment upon this absolute and proportionate increase in the number unable to speak English in 1910: "The proportion of foreign-born whites unable to speak English was decidedly greater in 1910 than it was in 1900. . . . The increase during the decade in the number of foreign-born whites 10 years of age and over was 2,930,273, or 29.3 per cent; the increase in the number of that age unable to speak English was 1,735,731, or 142.6 per cent. Thus of the total increase in the number of foreign-born whites 10 years of age and over, during the decade 1900–10, persons unable to speak English constituted approximately three-fifths. In the decade 1890–00 the number of foreign-born whites unable to speak English decreased by 153,764, or 11.2 per cent. . . . The increases during the decade 1900–10. . . are perhaps the most significant figures to be derived from the census returns relating to inability to speak English. The rapid increase in the non-English speaking element of the foreign-born white population is a fact of very considerable social consequence. The explanation of this rapid increase is, of course, to be found in the character of recent immigration. In the foreign-born white population returned in 1910 as unable to speak English, the actual number of immigrants unable to speak English, who came into the country during the decade 1900–10, must, in fact, considerably exceed the increase since 1900 in the number of foreign-born whites unable to speak English, as shown by the census returns, since a considerable number among the foreign-born whites returned in 1900 as unable to speak English must have died or left the country, or learned to speak English during the decade 1900–10."* An analysis of the statistics, however, leaves little room for doubt that

* Thirteenth Census, General Report and Analysis, vol. 1, pp. 1267–1268.

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is, of course, higher than the former. Of the 13,345,545 foreign-born whites in the United States in 1910, 2,572,123 (computed from Thirteenth Census, Vol. 1, p. 879), or 19.3 per cent were from England, Scotland, Wales, and Ireland. Assuming that of these English-speaking races the proportions of those 10 years of age and over is the same as that of foreign-born whites of all races, namely, 97.0 per cent, the number of persons 10 years of age and over of the English-speaking races was 2,494,959. Deducting this number from the total number of foreign-born whites, 10 years of age and over, the remainder, 10,459,570, represents the number of foreign-born whites 10 years of age and over of the non-English-speaking races. The total number of foreign-born whites 10 years of age and over unable to speak English in 1910 was 2,953,011, or 28.2 per cent of the total number of foreign-born whites 10 years of age and over of the non-English-speaking races. The per cent of the total foreign-born 10 years of age and over unable to speak English is only 22.8. The differences for each of the states could be estimated by the same method.

the increase in the decade 1900–10 is not so much due to "the character of recent immigration" as it is to an understatement in the number unable to speak English in the census of 1900. If the increase in the volume of recent immigration is the cause of the increase in the per cent unable to speak English in 1910, as compared with 1900, then, as will be seen from the following table, the census of 1900, as compared with the census of 1890, should have shown an increase in the proportion unable to speak English.

TABLE IV

IMMIGRATION TO THE UNITED STATES FROM NORTHERN AND WESTERN EUROPE, SOUTHERN AND EASTERN EUROPE, 1881–10. (ABSTRACTS OF REPORTS, VOL. 1, P. 64.)

Decade	Europe					
	Northern and Western		Southern and Eastern		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
1881–90	3,779,315	79.7	959,951	20.3	4,739,266	100.0
1891–00	1,648,613	45.8	1,942,164	54.2	3,585,777	100.0
1901–10	1,910,700	23.3	6,302,709	76.7	8,213,409	100.0

Table IV shows that in the decade 1891–00 the immigration from southern and eastern Europe was more than double the amount of immigration from the same countries during the decade 1881–90. In spite of this fact the census (Table III) shows for 1900 a *decrease* in the proportion unable to speak English. It will be seen, on the other hand, that the total volume of immigration during the decade 1891–00 decreased by 1,153,489, or a decrease of about 24 per cent as compared with the decade 1881–90, and that the decrease was from northern and western Europe and not from southern and eastern Europe. During the decade 1881–90 the number of immigrants coming from northern and western Europe was 3,779,315, while the decade following the volume of immigration from these countries decreased by 2,130,702, or about 59 per cent. If the *character* of the immigration accounts for the variations in the proportions unable to speak English (Table III), it then follows that the smaller proportion of immigrants unable to speak English in 1900 was due to the decrease of immigration from northern and western Europe and the corresponding increase of immigration from southern and eastern Europe.

The tables next presented (Tables V and VI) throw considerable doubt on the reliability of the statistics of inability to speak English as shown in the census of 1900. An attempt has been made in Table V to correlate the increase in the number of foreign-born 10 years of

age and over with the increase in the number unable to speak English. From the forty-eight states and the District of Columbia only the states which are particularly illustrative of the point in question are selected for incorporation in this table. It will be seen, for instance, that in 1900 New Hampshire showed an increase of 16,453 in the number of foreign-born 10 years of age and over and a decrease of 203 in the number unable to speak English in the same age group. The increase in the number of foreign-born whites in New Hampshire, as in other states, resulted either from direct immigration fromEurope or from migration from other states. Apparently this increase in the number of foreign-born in the state did not in the least increase the number unable to speak English in 1900 as compared with 1890, while in the decade 1900–10 a much smaller increase in the number of foreign-born whites 10 years of age and over was accompanied by even greater increase in the number unable to speak English.

TABLE V

INCREASE OF FOREIGN-BORN WHITES AND OF THOSE UNABLE TO SPEAK ENGLISH, 10 YEARS OF AGE AND OVER, 1890–00 AND 1900–10, IN SELECTED STATES

State	Increase of foreign-born whites				Increase of foreign-born whites unable to speak English			
	1900–10		1890–00		1900–10		1890–00	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
New Hampshire	9,434	11.3	16,453	24.5	9,676	56.6	—203	—1.2
Massachusetts	203,786	24.9	190,265	30.4	94,377	123.1	22,604	41.8
New Jersey	216,083	51.4	105,380	33.4	105,152	215.0	7,802	19.0
Ohio	127,154	28.1	6,577	1.5	111,970	216.4	—13,740	—21.0
Indiana	15,194	10.8	—2,630	—1.8	29,392	259.2	—6,369	—36.0
Illinois	216,853	22.8	141,353	17.4	163,256	158.0	—28,023	—21.3
Wisconsin	—7,049	—1.4	8,724	1.7	33,868	39.0	—45,130	—34.2
Iowa	—33,980	—11.2	—11,148	—3.5	11,625	45.5	—25,427	—49.9
Washington	134,448	133.8	17,595	21.2	21,753	570.2	—1,885	—33.1
California	191,942	61.2	25,988	9.0	55,901	297.3	—5,413	—22.3

In the state of Illinois the number of foreign-born increased during 1890–00 by 141,353, but the number unable to speak English decreased by 28,023 during the same period; however, in the decade 1900–10 an increase of 216,853 in the number of foreign-born whites 10 years and over was accompanied by an increase of 163,256 in the number unable to speak English. During 1890–00 the increase of foreign-born in Illinois was 17.4 per cent, accompanied by a decrease of 21.3 per cent unable to speak English, while during 1900–10 the increase of 22.8 per cent of foreign-born was accompanied by an increase of 158 per cent of those unable to speak English. Again, in Wisconsin an increase of 8,724 in the number of foreign-born during 1890–00 was accompanied by a decrease of 45,130 in the number unable to speak English, while

in the next decade a *decrease* of 7,049 in the number of foreign-born was accompanied by an *increase* of 33,868 in the number unable to speak English. In Iowa the census figures also appear improbable. A decrease of 33,980 in the number of foreign-born, during the decade of 1900–10, was accompanied by an increase of 11,625 in the number unable to speak English, while during the preceding decade a decrease of 11,148 in the number of foreign-born was accompanied by a decrease of 25,427 in the number unable to speak English. The condition shown in Table V, though perhaps not impossible, certainly appears highly improbable.

Apparently the number unable to speak English in 1900 was understated by the census. The decreases for the United States as a whole and for the states separately in the number unable to speak English as shown in 1900 (Tables III and V), in spite of the large increase in the number of foreign-born, suggest inaccuracy in the figures on ability to speak English as given in the Twelfth Census. An examination of the schedule used in that census suggests the source of error. According to the official explanation, the column "Can speak English" was in 1900 included in the schedule "under the general heading 'Education,' together with three other columns covering, respectively, school attendance, ability to read, and ability to write. In tabulating the returns for 1900, it became evident that the number of negroes returned as unable to speak English, though not in itself large, was nevertheless almost certainly an overstatement, and an investigation led to the conclusion that errors had probably arisen from the arrangement of the columns of the schedule. In a great majority of cases for the whites, and in a large number of cases for the negroes, a correct return necessitated writing 'Yes,' 'Yes,' 'Yes,' in answer, respectively, to the three inquiries, 'Can read,' 'Can write,' 'Can speak English.' The returns seemed to indicate that in the case of illiterate negroes enumerators had in some instances carelessly written 'No,' 'No,' 'No,' even when the illiterate person was in fact able to speak English. . . . Owing to the evidence of error in the returns the results of the tabulation for negroes were not included in the report for 1900, and in the tabulation for the negro population no comparison can be made of 1910 with 1900."*

Since in the case of negroes the enumerators had in some instances carelessly written "No," "No," "No," in answer to the three inquiries "Can read," "Can write," "Can speak English," it appears highly probable that enumerators often carelessly wrote "*Yes*," "*Yes*," "*Yes*," for the foreign-born whites in answer to the same inquiries. If this were the case, the number able to speak English among the foreign-born whites 10 years of age and over in 1900 would be about the

* Thirteenth Census, vol. 1, p. 1265.

same as the number of literates, while the number unable to speak English would be close to the number of illiterates. Table VI seems to justify this suspicion in regard to carelessness of enumerators in the case of foreign-born whites. The number unable to speak English in 1910 is almost twice as great as the number of illiterates in 1910, and in 1890 the number unable to speak English exceeded the number of illiterates by 223,473.

TABLE VI

FOREIGN-BORN WHITES TEN YEARS OF AGE AND OVER ILLITERATE AND UNABLE TO SPEAK ENGLISH, 1890, 1900, AND 1910. (U. S. CENSUS, 1910, VOL. 1, PP. 1213, 1277.)

Year	Total foreign-born 10 years of age and over	Illiterates		Unable to speak English	
		Number	Per cent	Number	Per cent
1910	12,944,529	1,650,361	12.7	2,953,011	22.8
1900	10,014,256	1,287,135	12.9	1,217,280	12.2
1890	8,786,887	1,147,571	13.1	1,371,044	15.6

But in 1900 the reverse is shown, the number of illiterates exceeding by 69,855 the number of those unable to speak English. There seems to be no other explanation for the excess of illiterates over the number unable to speak English in 1900 than that the number of the latter was understated in the Twelfth Census. The proportion of illiterates in the total foreign-born population 10 years of age and over in 1910 was almost half that of the proportion unable to speak English. In 1890, 15.6 per cent of the foreign-born population could not speak English and 13.1 per cent were illiterates. In 1900 the respective proportions unable to speak English and illiterate in the foreign-born population 10 years of age and over were very nearly the same. Of the immigrants arriving in the United States the number unable to speak English at the time of arrival greatly exceeds the number of illiterates, which accounts for the greater numbers of illiterates in 1910 as compared with preceding decades. Immigration during the decade 1891–00, as shown in Table IV, more closely resembled in character the immigration during the decade 1901–10 than that during the decade 1881–90; consequently, the difference between the proportions of illiterates and of those unable to speak English in 1900 should be nearer the difference in 1910 than in 1890.

Thus analyzed, the data presented in Tables IV and V seem to warrant the conclusion that the number unable to speak English was understated in the Twelfth Census and that consequently no comparison can safely be attempted between the number unable to speak English in 1910 and in 1900.

V. FOREIGN-BORN UNABLE TO SPEAK ENGLISH, 1910

The arrangement of the schedule in 1900, referred to above, was changed so that the cause for the error which was apparently made in 1900 was removed in the census following. The table next presented (Table VII) shows the condition in respect to inability to speak English

TABLE VII

PER CENT OF FOREIGN-BORN WHITES 10 YEARS OF AGE AND OVER OF TOTAL WHITE POPULATION 10 YEARS OF AGE AND OVER; AND PER CENT OF FOREIGN-BORN WHITES 10 YEARS OF AGE AND OVER UNABLE TO SPEAK ENGLISH, OF FOREIGN-BORN WHITES, AND OF TOTAL WHITES 10 YEARS OF AGE AND OVER, BY STATES

State	Whites 10 years and over	Foreign-born whites 10 years and over	Foreign-born unable to speak English, 1910	Per cent foreign-born of total whites 10 and over	Per cent unable to speak English	
					of foreign-born	of total white
United States	64,262,348	12,944,529	2,953,011	20.2	22.8	4.6
Arizona	155,968	43,724	25,072	28.0	57.3	16.0
Texas	2,341,815	224,580	125,765	9.6	56.0	5.4
New Mexico	239,646	21,235	11,776	8.8	55.5	4.9
West Virginia	852,897	54,646	27,461	6.4	50.3	3.2
Florida	330,978	32,155	14,049	9.7	43.7	4.2
Pennsylvania	5,846,624	1,390,564	466,825	23.8	33.6	8.0
New Hampshire	353,638	92,976	26,783	26.3	28.8	7.8
Delaware	138,303	16,940	4,824	12.2	28.5	3.5
Ohio	3,754,837	579,274	163,722	15.4	28.3	4.4
Indiana	2,109,755	155,596	40,731	7.3	26.2	1.9
New Jersey	1,953,369	636,848	153,861	32.6	24.2	7.8
Wisconsin	1,827,311	502,591	120,665	27.5	24.0	6.6
Louisiana	688,126	50,333	11,547	7.3	22.9	1.7
Illinois	4,400,806	1,168,559	266,557	26.6	22.8	6.6
New York	7,294,978	2,634,578	597,012	36.1	22.7	8.2
Wyoming	115,561	26,381	5,970	22.8	22.6	5.2
North Dakota	424,184	150,451	33,491	35.4	22.3	7.9
Kansas	1,277,020	131,673	28,358	10.3	21.5	2.2
Rhode Island	432,152	171,904	36,961	39.8	21.5	8.6
Oklahoma	1,096,319	39,064	7,975	3.6	20.4	.7
Connecticut	888,428	318,780	64,201	35.9	20.1	7.2
Nevada	69,353	17,787	3,557	25.6	20.0	5.1
South Dakota	442,769	98,334	18,486	22.2	18.8	4.2
Maine	602,227	105,336	19,589	17.5	18.6	3.2
Colorado	630,856	123,026	22,610	19.5	18.4	3.6
Michigan	2,221,695	579,803	102,286	26.1	17.6	4.6
Vermont	287,682	47,654	8,342	16.6	17.5	2.9
Maryland	843,496	100,951	17,544	12.0	17.4	2.1
Nebraska	917,307	172,497	29,519	18.8	17.1	3.2
Missouri	2,246,215	223,573	37,747	9.1	16.9	1.5
Massachusetts	2,710,966	1,020,594	171,014	37.6	16.8	6.3
Minnesota	1,622,269	533,915	89,850	32.9	16.8	5.5
Arkansas	807,078	16,454	2,741	2.0	16.7	.3
Alabama	879,219	18,291	3,028	2.1	16.6	.3
Mississippi	565,329	9,046	1,491	1.6	16.5	.3
Virginia	1,039,879	25,639	3,983	2.5	15.5	.4
Montana	301,918	89,456	13,718	29.6	15.3	4.5
California	1,988,999	505,312	74,706	25.4	14.8	3.7
Idaho	248,440	39,619	5,805	15.9	14.7	2.3
Iowa	1,747,906	269,246	37,169	15.4	13.8	2.1
North Carolina	1,088,200	5,734	779	.5	13.6	(a)*
Oregon	554,272	100,759	13,531	18.2	13.4	2.4
Utah	273,752	61,840	8,129	22.6	13.1	3.0
Washington	928,039	234,928	25,568	25.3	10.9	3.8
Kentucky	1,512,616	39,571	3,816	2.6	9.6	.3
Tennessee	1,260,516	17,985	1,648	1.4	9.2	.1
South Carolina	494,097	5,911	447	1.2	7.6	(a)
Georgia	1,038,916	14,656	953	1.4	6.5	(a)
District of Columbia	199,124	23,755	1,349	11.9	5.7	.7

*(a) Less than one-tenth of one per cent.

within the separate states in 1910. It will be seen that for the country as a whole the per cent of foreign-born whites 10 years of age and over unable to speak English was 22.8 per cent of the total foreign-born white population of that age group, and 4.6 per cent of the total white population 10 years of age and over. Thirteen states showed percentages unable to speak English above the percentage for the United States, varying from 57.3 per cent in Arizona to 22.9 per cent in Louisiana. The five states (Arizona to Florida) which show the largest proportions unable to speak English have 2.9 per cent of the total foreign-born whites* of the United States and 6.9 per cent of the total foreign-born unable to speak English in the country. The seventeen states (from Pennsylvania to Nevada) showing proportions of the foreign-born unable to speak English from one-fifth to about one-third, contain the greatest bulk of the foreign-born and of those unable to speak English. Table VIII shows the distribution of the foreign-born of the total white population and of those unable to speak English in the three groups of states. It will be seen (Table VII) that in the third group (from South Dakota to the District of Columbia) the proportions of those unable to speak English range from 18.4 per cent to as low as 5.7 per cent.

TABLE VIII

DISTRIBUTION OF THE TOTAL WHITE POPULATION AND OF THE FOREIGN-BORN WHITE POPULATION, 10 YEARS OF AGE AND OVER, AND OF THOSE UNABLE TO SPEAK ENGLISH, BY GROUPS OF STATES

	Arizona to Florida (5 states)	Pennsylvania to Nevada (17 states)	South Dakota to District of Columbia (26 states)	United States
Total white population 10 years of age and over	7,921,304	32,670,764	27,669,783	64,261,851
Total foreign-born whites 10 years of age and over	376,340	8,084,299	4,483,890	12,944,529
Total unable to speak English	204,123	2,033,040	715,848	2,953,011
Per cent of whites 10 years and over of total in U. S. 10 years and over	6.1	50.8	43.0	99.9
Per cent of foreign-born whites of total foreign-born whites in United States	2.9	62.4	34.6	99.9
Per cent unable to speak English of total unable to speak English in United States	6.9	68.8	24.2	99.9

It is seen from Table VII that in thirty-four states and in the District of Columbia the proportion of foreign-born unable to speak English is lower than for the country as a whole and that in Arizona, Texas, New Mexico, West Virginia, and Florida the proportions of non-English speaking are so much above the average for the United States as to present a separate problem.

* Unless otherwise specified the terms *foreign-born whites*, *total white population*, and *white population* are here meant to include only those 10 years of age and over.

VI. CONCENTRATION OF FOREIGN-BORN NO HINDRANCE IN LEARNING TO SPEAK ENGLISH

From Table IX it will be seen that the states which show the greatest concentration of foreign-born do not show the highest proportions of foreign-born unable to speak English. In Rhode Island, for instance, 39.8 per cent of the total white population 10 years of age and over is foreign-born, but the proportion of foreign-born unable to speak English is only 21.5 per cent, which is somewhat below the average for the country. Massachusetts, with a high proportion of foreign-born, shows a comparatively low proportion unable to speak English. In New York, where 36.1 per cent of the total white population is foreign-born, the proportion unable to speak English is not quite so high as for the United States. On the other hand, it will be seen from Table VII that in some of the states which show low percentages of foreign-born in the total white population, the proportions unable to speak English are higher than for the states shown in Table IX. Omitting such extreme cases as Texas, New Mexico, West Virginia, and Florida, it will be seen that Delaware, Ohio, Indiana, and Louisiana show proportions unable to speak English above the average for the country. In Kansas and in Oklahoma, where the proportion of foreign-born of the total white population is low, the proportion unable to speak English

TABLE IX

PER CENT OF FOREIGN-BORN WHITES 10 YEARS OF AGE AND OVER OF TOTAL WHITE POPULATION 10 YEARS OF AGE AND OVER, AND PER CENT UNABLE TO SPEAK ENGLISH OF THE FOREIGN-BORN WHITES AND OF THE TOTAL WHITE POPULATION, FOR CERTAIN STATES

State	Per cent foreign-born of total population 10 years of age and over	Per cent foreign-born unable to speak English of foreign-born 10 years of age and over	Per cent foreign-born unable to speak English of total white population 10 years of age and over
Rhode Island	39.8	21.5	8.6
Massachusetts	37.6	16.8	6.3
New York	36.1	22.7	8.2
Connecticut	35.9	20.1	7.2
North Dakota	35.4	22.3	7.9
Minnesota	32.9	16.8	5.5
New Jersey	32.6	24.2	7.8
Montana	29.6	15.3	4.5
Arizona	28.0	57.3	16.0
Wisconsin	27.5	24.0	6.6
Illinois	26.6	22.8	6.6
New Hampshire	26.3	28.8	7.8
Michigan	26.1	17.6	4.6
Nevada	25.6	20.0	5.1
California	25.4	15.8	3.7
Washington	25.3	10.9	3.8
Pennsylvania	23.8	33.6	8.0
Wyoming	22.8	22.6	5.2
Utah	22.6	13.1	3.0
South Dakota	22.2	18.8	4.2
United States	20.2	22.8	4.6

is higher than in such states as Massachusetts, Connecticut, Montana, Michigan and others in which the proportions of foreign-born of the total white population are high. From these data it appears that the concentration of immigrants does not act as a hindrance in their learning to speak English, but, on the contrary, seems to have an effect in the opposite direction.

VII. INABILITY TO SPEAK ENGLISH GREATEST IN RURAL COMMUNITIES

The next table (Table X) shows that in rural communities the percentage of foreign-born unable to speak English is higher than it is in urban communities. Of the total foreign-born whites 10 years of age and over in urban communities, 21.9 per cent were non-English speaking, while of the total rural foreign-born population of that age the non-English speaking were 25.2 per cent. The proportion for each specified class of urban communities is lower in every case than it is for rural communities.

Of the foreign-born whites unable to speak English, 2,042,881, or 69.2 per cent, were living in urban communities, of which number 833,404, or 40.8 per cent, were living in cities of 500,000 inhabitants or more.

The fact that in urban communities the proportion unable to speak English is lower than in rural communities shows, as has already been pointed out (Tables VII and IX), that the concentration of foreign-born does not retard their learning to speak English, but on the contrary seems to have the opposite effect. This may be due to better educational facilities in the cities as well as to a greater association between older and newer immigrants in organizations or in industrial establishments, or to wider association generally between immigrants and natives in urban communities.

TABLE X

FOREIGN-BORN WHITES UNABLE TO SPEAK ENGLISH, BY CLASS OF COMMUNITY. (THIRTEENTH CENSUS, VOL. 1, P. 1273.)

Class of community	Foreign-born white population 10 years of age and over, 1910		
	Total	Unable to speak English	
		Number	Per cent
Total	12,944,529	2,953,011	22.8
Urban communities	9,331,994	2,042,881	21.9
Places of 2,500 to 25,000	2,093,984	498,955	23.8
Places of 25,000 to 500,000	3,499,863	710,522	20.3
Places of 500,000 and over	3,738,147	833,404	22.3
Rural communities	3,612,535	910,130	25.2

VIII. INABILITY TO SPEAK ENGLISH, BY SEX

The Thirteenth Census* shows that for the country as a whole there is but a slight difference between males and females—a difference of four-tenths of one per cent in favor of the females. In the North and the West the proportions for the females are lower than for the males, while in the South the reverse is true. In three of the nine geographic divisions, namely, New England, West North Central, and West South Central, the proportions of females unable to speak English are higher than of the males. In the other six divisions the males show higher proportions unable to speak English. Of the total foreign-born white population 21 years of age and over, 22 per cent were unable to speak English in 1910 as compared with 22.8 per cent of the foreign-born white population 10 years of age and over. The proportion of total foreign-born whites 21 years of age and over unable to speak English was the same for both sexes.†

IX. INABILITY TO SPEAK ENGLISH, BY AGE GROUPS

Table XI shows the proportions of those unable to speak English in each of the eight age groups for which data are available. It will be observed that the highest proportion of non-English speaking is found (with the exception of the group "age unknown") in the 20- to 24-age group.

TABLE XI

FOREIGN-BORN WHITES UNABLE TO SPEAK ENGLISH IN 1910, BY AGE GROUPS, BOTH SEXES. (COMPUTED FROM CENSUS 1910, VOL. 1, PP. 322, 324, 1281.)

Age group	Total	Unable to speak English	
		Number	Per cent
10 years and over	12,944,529	2,953,011	22.8
10–14 years	358,330	56,405	15.7
15–19 years	673,761	227,649	33.8
20–24 years	1,430,381	497,511	34.8
25–34 years	3,168,411	902,949	28.5
35–44 years	2,711,568	538,798	19.1
45–54 years	2,071,415	324,865	15.7
55–64 years	1,321,103	192,488	14.6
65 and over	1,183,349	201,709	17.0
Age unknown	26,211	10,637	40.6

It was shown in Table I that beginning with age 14 the proportions of foreign-born whites attending school are considerably smaller than of the native whites and that these proportions keep declining steadily and sharply to the age of 20, at which age only 3.0 per cent of the for-

* Thirteenth Census, vol. 1, p. 1271.
† Thirteenth Census, vol. 1, p. 1271.

eign-born whites were attending school in 1909–10. Table XI shows that the greatest proportions of those unable to speak English are found within the ages of 15 to 34. The higher proportions of inability to speak English found in these age groups are very probably due to the fact that most immigrants arrive at these ages and that very few of them attend school. The steady decline downward in the proportions of those unable to speak English from the age group 25 to 34 to the ages 65 and over is no doubt due to the fact that a large proportion of the immigrants of the more advanced ages have been in the country long enough to have learned to speak English without schooling. It seems certain that if our educational institutions could reach the foreign-born between the ages of 15 to 34 (or even 15 to 24) they would not only reduce the proportions unable to speak English within these age groups but they would at the same time, of course, reduce the proportions of non-English speaking in the higher age groups.

The higher proportions of those unable to speak English at the ages of 65 and over are not significant for the reason that persons of that age do not generally participate actively in the life of the community.

X. SUMMARY OF CONCLUSIONS

The foregoing analysis of the data presented seems to warrant the following conclusions:

1. The problem of learning to speak English is one affecting only the first generation and about ninety per cent of our immigration.

2. The census data of 1900 on inability to speak English among the foreign-born are evidently inaccurate, and consequently no comparison can safely be attempted with these data.

3. The greatest number of those unable to speak English in 1910 is found in seventeen states (Tables VII and VIII, Pennsylvania to Nevada). Of the remaining thirty-one states, five (Arizona to Florida) show exceptionally high proportions of those unable to speak English. Within the remaining twenty-six states and the District of Columbia the proportions unable to speak English are comparatively low.

4. The states which show a very high proportion of foreign-born whites 10 years of age and over of the total white population of the same age group, or, in other words, the states which show great concentration of foreign-born do not show correspondingly high proportions of those unable to speak English, while on the other hand many states having a small ratio of foreign-born to the total population show higher proportions of those unable to speak English. Likewise, urban communities show lower proportions of those unable to speak English than do rural communities. It may be concluded, therefore, that concen-

tration of immigrants does not act as a deterrent in learning English, but seems to have an effect in the opposite direction.

5. The gradual decrease from the younger to the older age groups in the proportions of those unable to speak English, beginning with the ages 25 to 34, shows that a knowledge of spoken English comes naturally with increased length of residence in the country.

6. If effective measures could be taken to teach English to foreigners between the ages of 15 and 19, or between 15 and 24, the greatest number of non-English speaking would be reached and thereby the proportions of those unable to speak English would naturally be considerably reduced in the succeeding ages.

7. Exceptional socio-economic forces calling for special attention and study are in operation within the states showing very high proportions of non-English speaking foreign-born whites. (Table VIII.)

INDUSTRIAL CLASS ALIGNMENTS IN THE UNITED STATES

By Alvin H. Hansen, *University of Minnesota*

If all the urban wage-earners of the United States were to unite politically, would they constitute an overwhelming majority? What is the relative numerical strength of industrial wage-earners as compared to business proprietors and officials? What is the relative industrial and political strength, numerically, of the rural population? Under the existing industrial organization, how much room is there at the top? What opportunity is there for the average individual to rise to a position of comparative independence as proprietor, executive official, or professional person? In short, what proportion of the gainfully employed persons in the United States is compelled by the existing structure of industrial society to remain in the wage-earning class? Who is the "public" so far as industrial disputes are concerned, and how large is this class? In the conflicts that are forming on the basis of industrial class alignments, what is the maximum strength that the various groups may hope to muster?

The census data on occupations are not altogether satisfactory material upon which to base a conclusive answer to the above questions. The designation of occupations is not always sufficiently clear to make exact classification possible. In this respect the volume on occupations of the 1910 census is a considerable improvement over previous census reports on occupations. From this census the writer was able to classify 94 per cent of the gainfully employed persons. The censuses of earlier decades are not so clear in their designation of occupations, but it was possible to make a classification of about 91 per cent of the gainfully employed persons reported for the years 1900, 1890, 1880, and 1870. A study was also made of the reports on occupations for the years 1860 and 1850, with a view to presenting a continuous study from 1850 to 1910. The results for these two earlier periods were found, unfortunately, to be entirely unsatisfactory for purposes of comparison. There are two reasons for this: first, slaves were not included in these reports, and since they were largely devoted to agricultural pursuits the proportion of gainfully employed persons reported in agriculture was much too small; second, these two censuses report only the gainfully employed persons above the age of fifteen, while the succeeding censuses report all above the age of ten.

In two articles published in the *Journal of Political Economy*, Vol. 19, pp. 188–215; 309–337, Mr. Isaac A. Hourwich makes a classifica-

tion of the gainfully employed persons for the years 1870–00. He derived his classification in part from the census returns on occupations and in part from the census of manufactures and the census of mines and quarries. The present writer derived his classification exclusively from the volume on occupations of the Twelfth Census and Volume IV of the Thirteenth Census. The classification adopted differs somewhat from that of Mr. Hourwich, and the larger groupings are on considerably different lines. This study further brings the material down through the 1910 census. The 1920 census will, of course, not be available for some time.

It was found feasible to group all gainfully employed persons as reported in the above mentioned census volumes into the following main classifications:

1. Farm Laborers
2. Farmers
3. Proprietors and Officials
4. Professional Class
5. Lower Salaried Employees
6. Servants
7. Industrial Wage-earners
8. Unclassified

The designation "Farm Laborers" includes members of the family working on the home farm and laborers working out. This differentiation is made, however, only in the two censuses of 1910 and 1900. In 1910 the "home" laborers constituted 53.9 per cent of all farm laborers, and in 1900, 53.7 per cent. It was assumed that approximately this ratio obtained in the earlier decades as well, and the number of "home" laborers was therefore estimated by taking 53.8 per cent of the total number of farm laborers. Fifty-four per cent of all farm laborers in 1900 were under 21 years of age. It thus appears that the laborers working on the home farm are children of farmers not yet of age, while the laborers working out are very largely adults.

"Farmers" includes farmers, planters, dairymen, stock raisers, herders, drovers, and feeders. For the year 1910, gardeners, florists, fruit growers, and nurserymen are also included. The latter groups were for the earlier periods relegated to the unclassified group because the reports for those years do not distinguish between proprietors and laborers. "Farmers" includes both farm owners who farm their own land and tenants. In 1880 about 75 per cent owned their land, while in 1910 only 63 per cent were owners of the land operated.

"Proprietors and Officials," as the designation is here used, includes manufacturers and officials; proprietors, officials, and managers; transportation officials and superintendents; mining operators, offi-

cials, and managers; mechanical engineers; officials of banks and other companies; bankers and brokers; real estate and insurance agents; commercial travelers; merchants and dealers at retail and wholesale; auctioneers; undertakers; jewellers (not workers); livery stable keepers; garage keepers and managers; proprietors and managers of transfer companies; hucksters and peddlers; hunters and trappers: saloon keepers; restaurant keepers, hotel keepers; and boarding-house keepers.

The "Professional Class," for the purpose of this classification, is used in a broad sense and includes not merely the groups regularly referred to as professional, but also untrained nurses and such public service groups as detectives; sheriffs; marshals; policemen; officials and inspectors of municipalities, counties, states, and the federal government; soldiers, sailors, and marines; and life-savers.

The "Lower Salaried Employees" class includes foremen and overseers, clerks and copyists, stenographers and typewriters, bookkeepers and accountants, agents and collectors, inspectors and samplers, demonstrators, sales agents, ticket and station agents, express agents, baggage men and freight agents, mail carriers, chauffeurs, housekeepers and stewards.

The "Unclassified" group includes, in part, groups referred to in the census reports under some indefinite designation such as "other pursuits." Much the greater portion of this group, however, is composed of occupations for which the designation does not distinguish between proprietor and workmen, such as watchmaker, milliner, launderer, shoemaker, brewer, distiller. From 60 to 80 per cent is composed of master and journeymen trades, in which it is impossible to distinguish between proprietor and workman, such as barbers, bakers, blacksmiths, butchers, painters, paperhangers, plasterers, plumbers, and tailors. It is to be noted, therefore, that this "Unclassified" group would, if accurate classification were possible, fall very largely in either the proprietor class or the industrial wage-earning class. In all probability the proportion of entrepreneurs in this unclassified group is somewhat greater than the ratio obtaining between the designated proprietor and official class and the industrial wage-earning class. Especially is this true of the earlier decades for the reason that specialization and large scale production had not yet fully developed. For the same reason the occupation designations prior to 1910 necessarily distinguish less clearly among employers, employees, and persons working for themselves. Not only is the unclassified group larger, therefore, in the earlier periods, but—and perhaps this is of still greater importance—the proportion of entrepreneurs and proprietors to wage-earners is also larger in the earlier decades. The net effect is that the number given in the proprietor

and official group in the following table is something of an understatement, particularly for the earlier census periods.

"Industrial wage-earners" includes all wage-earners except servants, farm laborers, and that portion of the wage-earning class which falls for lack of clear census designation into the unclassified group.

The number of gainfully employed persons falling into each of the classifications just described is given in Table I. The percentage distribution is given in Table II. It will be noted that the proprietor and official, professional, salaried, and wage-earning groups have steadily become more important relatively. Servants have declined in relative numerical importance. Farmers held their own until after 1890 and then upon the disappearance of free land rapidly declined. The percentage of farm laborers decreased rapidly until 1890, which indicates that while free land could be obtained a larger and larger proportion of our agricultural population were becoming independent farmers. Since 1890 the proportion of the rural population that are farm laborers has been rapidly increasing. There also appears to be some increase in the farm labor class as compared to the total gainfully employed population. However, because of inadequate instructions to enumerators, earlier censuses do not give so complete returns for farm laborers as does the 1910 census.* From 1900 to 1910 there was probably a slight decrease (instead of the apparent slight increase indicated) in the proportion of farm labor to the total gainfully employed population.

TABLE I

	1870	1880	1890	1900	1910
Farm laborers	2,885,996	3,323,876	3,004,061	4,410,877	6,143,998
Farmers	3,000,229	4,282,074	5,370,181	5,770,738	6,229,161
Proprietors and officials	581,378	807,049	1,347,329	1,811,715	2,879,023
Professional	414,708	666,338	1,114,507	1,565,686	2,074,792
Lower salaried	309,413	529,473	965,852	1,329,928	2,393,620
Servants	975,734	1,075,655	1,454,791	1,453,677	1,572,225
Industrial wage-earners	3,328,351	5,286,829	7,360,442	10,263,569	14,556,979
Unclassified	1,010,114	1,420,795	2,118,498	2,467,043	2,317,538
Total	12,505,923	17,392,099	22,735,661	29,073,233	38,167,336

TABLE II

	1870	1880	1890	1900	1910
Farm laborers	23.1	19.1	13.2	15.2	16.1
Farmers	24.0	24.6	23.6	19.8	16.3
Proprietors and officials	4.6	4.6	5.9	6.2	7.5
Professional	3.3	3.8	4.9	5.4	5.4
Lower salaried	2.5	3.0	4.3	4.6	6.3
Servants	7.8	6.2	6.4	5.0	4.1
Industrial wage-earners	26.6	30.4	32.4	35.3	38.2
Unclassified	8.1	8.2	9.3	8.5	6.0

* Census of 1910, Vol. IV., pp. 26–29.

INCREASING INDUSTRIALIZATION

The increasing industrialization of the country and the relatively declining importance of agriculture are indicated in Table III. Here the gainfully employed population is grouped under three categories, if we omit from our consideration that portion designated as unclassified. The first group includes the proprietors and officials, the lower salaried and professional classes. It is the "white collar" urban population, not all even moderately well circumstanced, but constituting on the whole the middle and upper urban class. The second group is composed of all gainfully employed agriculturalists—the farmers, tenants, and farm laborers. This group represents what remains of the old type of American individualists. The industrious and frugal tenant in most cases still becomes in time, though with increasing difficulty, a farm owner. The farm laborer, with the exception of the relatively small migratory class, hopes to save enough to set up as an independent tenant. Getting on is still largely a matter of individual push and initiative. True, the problems of organization and control of markets loom larger and larger, but the road to independence and advancement is still open even though it is not so easy and broad as before. The third class is composed of urban workers—the industrial wage-earners and servants. They are for the most part shut up in the wage system. If they are to better their condition they must do so not by way of escape to something else, but by improvement of their lot as wage-workers.

The farming group is being increasingly cut into on one side by the business, salaried and professional group, and on the other side by the industrial wage-earners. The relative growth of the former group would seem to be a healthy sign, but it should be noted that a large part of this growth, nearly a half in fact, is due to the rapid increase of the lower salaried employees whose position is certainly not very desirable. Further than that, not only is the rural group declining in relative importance, but within that group itself the opportunities for advancement are narrowing down, as has already been shown, because of the encroachment of tenants and farm laborers upon the farm owning class.

TABLE III.

	1870	1880	1890	1900	1910
Urban upper and middle class	10.4	11.4	15.1	16.2	19.2
Rural group	47.1	43.7	36.8	35.0	32.4
Urban workers	34.4	36.6	38.8	40.3	42.3
Unclassified	8.1	8.2	9.3	8.5	6.0

INDUSTRIAL INDEPENDENCE

Yet in spite of these tendencies it is surprising to find what a large proportion of the gainfully employed population are business men, farmers, and professional men. Table IV shows that in 1910 about 38 per cent still belonged to this independent class. Disregarding again the unclassified, the gainfully employed population is here placed in two groups. One group is composed of the business and professional classes, farmers and the children of farmers. The latter, of course, expect to become independent farmers upon reaching maturity, and hence, while listed as laborers, from the standpoint of this classification they may properly be classed with the farmers. This, then, is the industrially independent group, independent not so much from the standpoint of income as from the standpoint of being one's own boss.

The second group is composed of the rural and industrial wage-earners and the lower salaried employees. No doubt some of this group receive incomes in excess of many farmers, and even of professional and business men. But their outlook is different because of their place in the industrial system. The old type of American industrial ideals, based on individual proprietorship and industrial independence, may be expected to hold sway—so far as the former group is concerned. But the old slogans do not fit the life of the latter group, and the old appeals cannot be expected in the long run to be successful. This is by no means saying that it is a homogeneous group or that any one type of appeal can be made to all.

TABLE IV

	1870	1880	1890	1900	1910
Proprietary and independent class	44.3	43.3	41.5	39.6	37.9
Rural and urban working class	47.6	48.4	49.2	51.9	56.0
Unclassified	8.1	8.2	9.3	8.5	6.0

LABOR, CAPITAL, AND THE PUBLIC

The class conflicts that are forming on the basis of the growing class alignments are many and varied, but the one which looms up in overwhelming importance is the struggle between labor and capital. In connection with this struggle the neutral party, the so-called public, is frequently referred to. It is admittedly difficult to define this group in a manner that will give general satisfaction. Nevertheless, an effort will be made to determine which of the various groups listed in Table I may properly be placed in each of the three groups, "labor," "capital," and the "public."

To answer this question a merely mechanical classification on the basis of industrial status will not suffice. The classification to be realistic must be based to a certain extent on industrial psychology. As Hoxie put it, those "who feel that their interests are identical with those of the employers, whose motives, habits of thought, social attitudes and sympathies are in harmony with the mass of employers belong to the employing class." Such a basis of classification, however, must not be used without due consideration of the industrial status of the group concerned. We must consider not only the conscious alignments that have actually materialized, but also the probable field of alignment in the not far distant future. Both industrial status and industrial psychology must be considered.

The entire group here designated as industrial wage-earners may, on the whole, safely be placed in the class referred to above under the title of "labor." It is true that many in this group have not as yet developed any marked class consciousness, and the status of some of them is of such a nature that they are likely to continue to partake to some extent of the psychology of their employers. But for the overwhelming majority this group constitutes a fertile field for working-class agitation and movements. None of the other groups here given can be placed in toto in the "labor" class. Most farm laborers still expect to rise out of the wage-earning status and therefore are lined up with the farmers as far as their industrial psychology is concerned rather than with the wage-earners. The servant class, although not having the prospect of independence that farm laborers have, cannot as yet be properly placed in the "labor" class because of personal relationship with their employers on the one hand and isolation from their fellows on the other. The lower salaried employees, although sometimes worse off than the higher paid industrial wage-earners, still take their cue from their employers and imagine themselves to be a part of the "business" world. There are indications that the above statement no longer holds for England, but for the United States, as far as the industrial conflict is concerned, this group may properly be placed with the proprietors and officials in the class referred to under the designation "capital."

The term "public," then, comprises all those who are not directly involved in the industrial conflict. Farmers and farm laborers pretty clearly belong to this class. The servant class is more doubtful. For reasons given above this group cannot properly be classed with "labor." Nor are they by occupation and outlook tied to the business class in the way that the small salaried employees are. It seems, therefore, best to class them with the public. The professional class is also some-

what doubtful. It is certainly true that a large part of the professional class have the social attitudes and sympathies of the employing class. On the other hand a considerable body of clergymen, physicians, nurses, and teachers find their sympathies leaning toward labor. At any rate, as far as their industrial status is concerned, they are for the most part in a position to take a fairly neutral point of view. I have therefore included them with the "public" group.

The unclassified group, if it could be distributed, would for the most part swell the ranks of "labor" on the one side and "capital" on the other, probably, in about the same proportion as given below.

What then is the relative strength of "capital," "labor" and the "public?" One sees the statement time and again that labor represents the *overwhelming* majority. From Table V it is clear that on the basis of any realistic classification "labor" is not even a majority. It also appears that the numerical strength of "capital" as compared to "labor" is much larger than is commonly supposed. The ratio is approximately one to three. So far as the numerical influence politically is concerned even this ratio is deceiving for the reason that relatively few of the "capital" group are non-voters, while a very large proportion of the "labor" class are disenfranchised because of being minors, aliens, or negroes. Nearly one-fifth are minors, nearly 4 per cent are adult negroes, and a large proportion of the foreign-born wage-earners are not yet naturalized. On the other hand, in the "capital" class, the only group that includes very many minors is the lower salaried class, and even in this group the minors constitute less than 16 per cent. Negroes and aliens do not cut much of a figure in the "capital" class.

It is clear that the "public" in 1870 constituted a good sized majority. Since 1890 this majority has, however, rapidly dwindled until in 1910, though still larger than the labor group, it constituted only 42 per cent of the total gainfully employed population. Besides, this group contains a great many non-voting negroes and minors under voting age and some aliens. About 25 per cent of the rural gainfully employed persons are under 21 years of age and about 10 per cent are adult male negroes. There are also the foreign-born agriculturalists who are not yet naturalized. Of the servant class about 30 per cent are minors, and about 22 per cent adult negroes. Twenty-five per cent are of foreign birth and a very large proportion of these are not naturalized. As regards the professional class, about 10 per cent are minors. Most of the adult negroes in this group (about 4 per cent) no doubt have the suffrage. It is therefore clear that the "public" and "labor"

groups suffer very much more in the proportion of their non-voters than the capital group.

TABLE V

	1870	1880	1890	1900	1910
Capital	7.1	7.7	10.2	10.8	13.8
Labor	26.6	30.4	32.4	35.3	38.2
Public	58.2	53.7	48.1	45.4	41.9
Unclassified	8.1	8.2	9.3	8.5	6.0

METHODS OF DEVELOPING AN INDEX OF COLLECTION CONDITIONS

By W. H. Steiner, *Federal Reserve Board*

I

One of the most important problems which confronts the individual business enterprise is that of determining the status of its collections. In addition to determining the terms upon which it will sell, and checking the credit of the individuals and enterprises to which it sells, it must also take account of the degree of promptness with which payments are made to it by these trade debtors for the merchandise which they have purchased. In other words, it must consider the relation which actual collections bear to the terms upon which the goods are nominally sold. Not only, however, is the individual enterprise interested in its own experience, but it is interested as well in the general experience in its particular line of business and in its particular territory, while in addition it must consider, though perhaps somewhat less immediately, the general situation relative to collection conditions which prevails among business enterprises as a whole and in the country at large.

The latter problem, however, is of interest also to the student of general business conditions. It is well known that collections fluctuate with general business conditions. This variation may occur in one of several ways. To illustrate, let us consider as typical terms upon which merchandise is sold, 1 per cent 10 days, net 30 days; that is, a cash discount of 1 per cent is permitted for payment within 10 days from date to invoice, while in the event that the buyer does not elect to take the cash discount, the bill is due net at the close of 30 days after date of invoice. When funds are readily obtained by the purchaser, either through prompt payment made to him by those to whom he sells his merchandise or through borrowing direct from his bank, he will elect to take the cash discount. The discount in the illustration which we have taken will be roughly at the rate of 18 per cent per annum, while if he borrows, the cost of the funds to him in general will be merely 6 per cent per annum, or less in certain cases. In other words, when business conditions are "good," there in general will be a high percentage of accounts which take the cash discount. The reverse will be the case when "money" is tight and bank reserves decline and interest rates rise, so that funds either become more difficult to obtain, or borrowing to take the cash discount at least becomes

less profitable through a narrowing in the margin between the interest rate and the discount, while at the same time the purchaser's own collections are slower. In addition, at such times, the percentage of accounts which are not paid within the net period, but which instead run past due, will increase. In certain cases an extension of additional time may be requested, or a note running 30 days or longer may be tendered at the expiration of the original net period. Both of these forms will be found more frequently at such times. The relative extent to which each occurs will vary from industry to industry. Assuming an ordinary cash discount sufficiently large to be attractive where the bulk of the accounts sold are large well-rated firms, the regular percentage of accounts taking the cash discount will be large, and the change in general business conditions will be reflected principally in the decrease in the percentage of cash discounters. Where the reverse is the case, the change will be reflected chiefly in the percentage of past due accounts.

It will be observed that we have spoken of collections as fluctuating with general business conditions, according as the latter are "good" or "bad." Applying the modern theory of the business cycle, it would appear, however, that the change in conditions would already become apparent toward the close of the period of prosperity, as a "credit pinch" developed. But the exact relation of collections to the course of the business cycle is extremely difficult to ascertain. The chief obstacle lies in the difficulty of obtaining definite statistical data relative to collections. This in large part is due to the fact that no standard device exists for measuring collections, and various methods are thus employed at the present time. The methods in fact vary to some extent from industry to industry and are largely devised to meet the credit conditions peculiar to the industry in question. The statistical problem is chiefly one of the unit to be employed. What shall be taken to show the status of collections? All other aspects of the question are subordinate to this. It will be evident from the previous paragraph that the task is by no means simple and that numerous difficulties arise. In particular, credit conditions and terms on which merchandise is sold are by no means homogeneous, but vary considerably from industry to industry. In addition to the difficulty experienced in developing an index for a given industry, there then exists a further difficulty in attempting to show the general status of collections throughout our industrial life as a whole. The simplest approach will be to consider the various methods by which the individual business house may attempt to measure the status of its collections, and to indicate the suitability of the several methods under

different types of terms on which merchandise is sold. To these methods we shall now direct our attention.

II

An ideal method of measuring the status of collections would appear to be through the use of an absolute collection percentage. Assuming that a month be the period of time chosen, there would be calculated each month *the percentage which the amount actually collected is of the amount which should have been collected.* Perfect collections would be indicated by 100 per cent and the actual percentages shown would range between the limits of 0 and 100. The use of this plan would involve ascertainment of a method of calculating both the numerator and denominator of the fraction employed to compute the percentage. Serious difficulties arise in connection with the denominator. Exactly what is the "amount which should have been collected?" It might appear that the test would lie in payment of accounts according to terms. But where a cash discount system prevails, if, to take the two extreme cases, on the one hand, all accounts are discounted, or on the other hand, all accounts are paid only at the expiration of the net period, payment in both cases is made according to terms. Yet in the second case collections are decidedly slower, and in industries in which in general a high percentage of accounts is discounted, the slowing up of collections will be found largely in this form. To take cognizance of this fact, it would be necessary to employ an approximation, shortening the average time represented by the net terms to take account of the customary proportion of accounts discounted. Payment of all accounts within that period would then be represented by 100 per cent.

One point stands out in this discussion. We have considered merely the proportion of accounts paid within a given period. Instead, we must take cognizance also of the time which is actually taken for payment. Not only is this the case for accounts paid at or prior to the expiration of the net period, but the time taken for the payment of delinquent accounts is also of significance, yet we have not considered it at all in the above discussion.

A second ideal method, supplementary, however, to the first, would then appear of calculating an absolute collection percentage. There would be calculated each month the *percentage which the average actual number of days in which accounts were paid was of the average actual number of days time on which the goods were originally sold.* In this case the denominator would again cause difficulty. Approximation alone would be possible, the average time represented by the net terms

being shortened in the manner indicated above. To employ a specific illustration, assuming that the average length of terms computed in the manner just indicated was 20.086 days, the fraction employed in obtaining the collection percentage might read as follows:

$$\frac{250{,}000\times 10+200{,}000\times 15+500{,}000\times 30+50{,}000\times 40}{1{,}000{,}000\times 20.086}.$$

Assuming that the methodology was thus determined, it would be possible to calculate these percentages. To do so, however, would entail considerable additional expense and labor, as it would be necessary to trace each individual sale and to keep specific records for this purpose alone. Let us, therefore, examine the data which are contained in the records of the individual enterprise relating to its ordinary operations. Fundamentally, the data available represent (1) collections during the period, (2) outstandings, that is, accounts receivable on the books, at the opening and close of the period; and (3) sales during the period. But each of these in fact must be further resolved into several constituent elements. Collections are of four kinds: (1) amounts paid by those taking the cash discount, either within or without the cash discount period; (2) amounts paid prior to the expiration of the net period, that is, "anticipations" of the latter; (3) amounts paid at the expiration of the net period, and (4) amounts paid after the close of the original net period. Outstandings are either (1) current, that is, not yet due, or (2) past due. A further classification of these according to month when due and age, respectively, would appear desirable. If outstandings and collections be compared, the situation for a given month, such as September, would be as follows:

Outstandings on September 1	Collections during September
Past due	Collections against old past due accounts
Current, due net in September	Collections of current items at close of net Collections of current items after close of net Anticipations of current items
Due net in October, etc.	Discounts and anticipations of accounts due net in October and subsequent months Discounts and anticipations of accounts representing September sales

Where sales are employed as the norm, it would be necessary to consider the length of the net terms, and in particular to eliminate accounts bearing a season dating. A cruder measure in general would appear to be afforded than by the use of outstandings.

In fact, it would appear possible to obtain a substantially accurate percentage only where proximo or e.o.m. terms are employed, and for all the accounts, not merely for active accounts. In such cases all sales made during a given month, and shipped prior say to the 25th, are due (or subject to discount) on a specified date of the following month, most frequently the 10th. The outstandings at the close of the month, which are due on the 10th, afford an indication of the amount which should be received. Where, however, a large proportion of the accounts are paid only at the expiration of the net period, the figure will show merely the percentage of accounts taking the discount, and were it desired to supplement it, adjustment would be necessary, in which case the problems arising are similar to those indicated above. On the other hand, in industries in which the great majority of accounts will be paid by the 10th proximo, the method is of considerable value. It in fact is employed by the larger rubber companies in following the status of their collections from month to month, in particular for tires. In the latter industry terms in general are 5 per cent 10th proximo, 75 to 85 per cent of accounts of leading manufacturers are discounted, and a period within which accounts are due net is frequently not specified. Eliminating for ordinary months accounts which bear the spring dating, the outstandings at the close of the month may be taken as a norm. For comparison herewith, there is taken either the amount of these outstandings which have not been paid by a later date, such as the 15th or 30th, 5 and 20 days "grace" respectively being allowed in these methods, or there may be taken the collections which are made up to this later date. It is customary also to analyze further the outstandings at the close of the month. Separation is made according to age, those which are current, 30 days old, 60 days old, and 90 days old and over generally being distinguished. In many cases, of course, other classes of rubber goods are handled, and these often are not separated, what is termed by one company "a collectible" trial balance, for example, being figured in order to show the accounts on which they are actively working during the next 30-day period. Collections in the industry are largely made by credit managers at the branch houses, who each month report the data outlined above, as well as the condition of selected individual accounts, to the principal office which in this manner keeps informed as to the collection situation. Due to the peculiar terms employed in the industry, it is thus possible to follow the status of collections with substantial accuracy.

A possible application of this method is suggested in the case of highly seasonal industries in which season datings, affording annual

or semi-annual settlement dates, are found. Men's clothing to some extent falls in this category, also manufacturing of fur. A similar situation prevails in the case of the agricultural sections, such as, for example, the Northwest, where October 1 is the "big pay day." A valuable indication would be afforded in such industries and sections by a consideration merely of the proportion of the amounts due at that time which was paid, no definite data for other periods of the year being obtained.

III

In industries in which proximo terms are either employed to a limited extent only or not at all, the ideal methods outlined above serve merely as guides and other more arbitrary and at the same time cruder methods are necessary. These in general are of two kinds. On the one hand, effort is made to arrive at what is a rough approximation to the denominator in the fraction considered above, and with the basis of expectancy thus obtained, there is compared a numerator representing collections made. As will be indicated presently, both numerator and denominator may be calculated in several ways. By this means, an expression is obtained for the flow of payments in relation to volume of business done. The second method consists of a *division of outstandings on a given date into current (that is, not yet due) and overdue.* In general the latter item is used in this manner only in the construction of an index, and is not compared with other items. It is not usually analyzed further by business houses according to age or length of time overdue, although a period of grace may be provided, accounts 30 days or more overdue, for example, merely being considered. The amount of accounts overdue is then expressed as a percentage of total outstandings on the given date. This method is frequently employed to supplement an index of the first mentioned description. Although of a simple nature, it may be very expressive. The decided decline in collections which many manufacturers of men's clothing have experienced this year is well illustrated by figures of the above description prepared by a leading manufacturer, which show that 82 per cent of his outstandings on June 30 were more than 30 days old, as against only 23 per cent on April 1. An interesting variation of the method is employed by another leading manufacturer who divides total outstandings at the close of the month into those originating (a) in the season previous to that just passed, (b) in the season just passed, and (c) in the present season. The percentage which each is of the total outstandings on that date is then calculated. Seasons, of course, change every six months.

There is, however, a danger that, used by itself, this method may serve rather as a record of past events, which are clearly perceived when passed in review, than as an effective record of the present situation and one which promptly calls the attention of the observer to the changes which are occurring at the time. But this may probably be held also in greater or lesser degree against any single index which may be constructed. It, however, points the way to the first test that any index which is developed must face. The index must give a prompt and a fairly accurate reflection of the collection situation, meaning by the latter requirement merely that the change which occurs in the index shall vary roughly in magnitude with the actual change which occurs in the collection situation. This requisite may be summed up rather roughly in the term "sensitiveness." But this test implies also that, second, the index include a proper basis of comparison or expectancy, and that this basis be not susceptible to purely extraneous influences, such as an increased volume of business which does not immediately affect the actual collection situation. Assuming that these general criteria are satisfied, the index chosen must be adapted to the credit conditions prevailing in the industry in question, in particular the terms of sale and the percentage of accounts which are discounted instead of being paid only at the expiration of the net period. Considered alone, the analysis of outstandings on a given date is of value rather in industries in which the greater proportion of accounts are not discounted, or in which net terms exclusively prevail. In industries in which the reverse is the case, the method serves instead basically as a supplementary device to take cognizance of the situation with respect to the accounts which are not discounted.

In industries of this description, an index of the first type is desirable. Several methods exist of constructing this type of index, and they consist largely of varying combinations of the several items enumerated above as supplying the working tools in actual practice, namely, sales, collections, and outstandings. Neglecting minor variations, either sales or outstandings may be taken as the basis of expectancy. With the item chosen, the collections made are then compared, or, where sales are employed, the same result may be indirectly obtained through the use of the outstandings at some later date. Let us consider at somewhat greater length typical examples of each of these two forms.

(1) *Calculation of the Percentage Which Outstandings on the First of the Month Are of the Previous Month's Sales.* The percentage may be stated, for example, either as of July 1, or for June, and both forms are in use. It is the recognized method employed by wholesale groc-

ers. About twelve state or territorial associations regularly obtain such reports each month from part of their membership, and their preparation reflects the widespread interest in the industry during the last few years in closer collections. Collection of all accounts within 30 days would be represented by a percentage of 100. As it would appear that on the whole approximately half the accounts of wholesale grocers are discounted, a shortening of the time would seem to be called for, but against this may be roughly set off active accounts on which proximo terms are granted, and the figure of 30 days may thus be retained. The percentage obtained may easily be converted into a figure representing the number of days' business outstanding, or, as sometimes phrased, the number of days in which accounts are collected. The latter figures, however, are employed comparatively seldom as compared with the percentage of outstandings. Another variation that has been employed by one wholesale grocers' association is the comparison with sales during a given month of collections during that month, instead of outstandings on the first of the following month. With this method, direct instead of indirect measurement of the flow of collections or rapidity of credit turnover is made. It may be noted that where longer terms are in use, sales during a previous month may be employed in order to give an approximate basis of expectancy, or else the amount of charges (representing shipments) may be employed. In such cases, moreover, collections rather than outstandings in general will be employed for purposes of comparison, and the method is in fact employed by a number of shoe wholesalers.

Prevailing wholesale grocery terms on the general line (excluding special items billed separately) are 1 per cent 10 days, net 30 days, one month's sales being due net during the following month, although proximo terms are also frequent on active accounts. The method is thus better adapted to that industry than to one in which longer terms prevail. Outstandings, aside from old overdue accounts, consist merely of amounts due net during the month, and do not represent a heterogeneous mass due net in any one of several months to come. But sales do not in all cases provide a fair basis of expectancy. This is particularly noticeable at seasons of the year when retailers purchase heavily, the percentages decreasing in consequence of the increase in the denominator. Moreover, in contrast to the situation which prevails where outstandings on a given date merely are analyzed over a period of time, the percentages of outstandings shown are affected by a shortening of terms, and this influence, as well as closer collections, has been present in the general decrease during the past few years in the percentages shown by wholesale grocers. But on the other hand

this shortening of terms merely reflects the changes in progress in general business conditions.

One further question arises in connection with the construction of an index of this description. While in general no specific definition of the terms "sales" and "outstandings" is given, in the case of one association total outstandings are requested, no matter how represented, whether by note, or secured by mortgage, or otherwise. This raises the problem of the extent to which the percentage should be raised by including old past due accounts which such settlements will represent, and how far it should be kept "fresh" to depict the current situation. The question of the legitimacy of including cash sales has also been raised, inasmuch as such sales may largely represent intergrocer transactions, and thus do not enter into a true reflection of collections made by wholesale grocers of retailers' accounts with them.

(2) *Calculation of the Percentage of Collections During the Month to Outstandings on the First of the Month.* This method appears to be in considerable use among wholesale dry goods houses. Inasmuch as the regular terms on the general line in the industry are 2 per cent 10 days, 60 days extra, with anticipation permitted at the rate of 6 per cent per annum, making the discount for cash 3 per cent 10 days, while certain items also bear special terms, the method possesses at once certain elements of both strength and weakness. On the one hand, collection figures for any given month must have a wider basis of expectancy than is afforded by any single month's sales, and from this point of view, outstandings are probably the most satisfactory type of date. But they are subject to the influence of a changed volume of business, and where the industry, in particular in the West, is decidedly seasonal, datings, in general April 1 and October 1 on the general line, have been customary. In fact, certain houses state specifically that no value is attached to month to month comparisons, but that comparison alone is made with the same month of the previous year. Over a period of time, this type of index shows the influence of change in terms, but, as remarked above, this change in terms itself reflects the change in business conditions. Variation of the method is reported by one wholesale drygoods house, which adds to outstandings on the first of the month, both due and past due, the collections during the month, in order to obtain the basis of expectancy, and then compares collections therewith. Another house instead adds the charges during the month to the outstandings on the first of the month and compares the collections with this sum. In both cases, the thought is to include a basis of expectancy for that part of the present month's sales which is discounted and which would not be included in the outstandings on the first of the month.

The general method of comparing collections with outstandings is also employed to some extent by manufacturers of men's clothing. This line, however, is of a decidedly seasonal nature, season settlement terms, in general June and December, still largely prevailing, although within the last few years a number of houses have shortened terms or eliminated datings. The device then will be of value rather as the monthly changes in outstandings are considered in relation to the monthly changes in amounts collected, due allowance being made for season settlement dates, and the course of both items is compared with previous years. In so doing we abandon the plan of construction of a specific index, and consider instead changes in the actual items themselves. It will be observed that in the general method of comparing outstandings and collections, we in fact depart in considerable measure from the conception of finding an absolute basis of expectancy and adopt instead the thought of the relation of the flow of payments to non-payments.

There is also a further variation of this general method. The same principle may be applied as in the case where outstandings are analyzed into those which are current and those which are past due. In the present case, collections during the month may be compared with the outstandings at the close of the month, the sum of the two in fact affording a rough basis of expectancy.

In seasonal industries, cumulative percentages are frequently calculated for the current season, either in place of or supplementary to the monthly percentages. Sales and collections are most frequently employed, although the average of the outstandings at the close of each month to date may also be used in place of sales.

IV

In the construction of an index in this manner for a given industry, it is necessary for a central agency to obtain data from the individual houses and to combine the individual returns and prepare composite figures. Where returns are made in percentage form by the individual house, a method of weighting should be employed in order to assign approximately the proper degree of importance to the figure from each house. But this in fact is not done by any of the state and territorial wholesale grocers' associations, which are perhaps the most prominent organizations preparing such reports at the present time. In addition, the number and identity of the reporting firms varies somewhat from month to month. Additional importance is to be ascribed to lack of weighting because of the fact that the figures of the individual houses vary greatly, the extreme high and low percentages in

the California report (covering 29 houses) for August 1, 1920, e. g., being 63.0 and 135.0, and the average for the state 100.2 per cent. The figures of each individual house are generally shown (though no names are given) and in certain cases figures of the same house for two months are placed opposite each other for purpose of comparison. At the bottom of the sheet is given the unweighted average calculated from the actual returns given above. Inasmuch as the operations of wholesale grocers frequently cover only a relative restricted territory, no question arises of the separation of accounts according to the territory in which located. In other industries, however, in which the business is perhaps even of a nation-wide character, separation of accounts according to territory is manifestly desirable. But in many cases business houses are unable to make the separation as the ledgers are kept alphabetically, or else the names of the states are arranged alphabetically. This is the case with some of the largest firms in the country at the present time, conspicuous examples which the writer recalls being a leading shoe manufacturer and a leading textile commission house.

The problem next arises of interpreting such data. This is complicated by the fact that in many industries, as already remarked above, such as wholesaling of groceries, a strongly marked secular trend is shown during recent years as the result of the existence of a sellers' market. Reports of wholesale grocers have had as one of their primary purposes to afford an indication of the extent to which closer collections were being made and terms were being shortened.* Moreover, the actual percentages on the whole show a marked seasonal change, more noticeable again since the close of the war, during which the tendency was somewhat submerged, and allowance must be made for this. In addition, choice of the base period is necessary. The problems in this connection, however, are substantially similar to those presented by any indices of business conditions and need not be considered here.

So much for the construction of an index for a given industry. For an understanding of general business conditions, the problem next arises of selection of industries which will either best anticipate (as has been claimed for certain wholesale price index numbers) or best depict conditions. In the construction of an index of general collection conditions, the method of sampling must be employed and certain industries alone considered, whether the final index consists merely of a series of indices reflecting conditions in each of the several industries, or whether these several indices be combined into one composite num-

*Reference may be made to the addresses and articles of Mr. F. C. Letts, President of the Western Grocer Company, Chicago.

ber. In short, the problem which confronts us is as to which industries are most sensitive or most representative. This involves selection from among the several stages of the economic process, as well as selection from among the various classes of commodities. On the one hand, it would appear that enterprises selling the retailer would first experience a decline in collections, rather than enterprises selling the wholesaler, while on the other hand it would appear that collections in lines handling luxuries rather than necessities would likewise first show a decline. An added consideration would of course be the average size of the purchasing firm, which is partly covered in the division of the economic process into stages. Finally, terms in the industry should be fairly standardized, although they of course should not be extremely short, such as two weeks or less. Although certain guiding principles may be laid down, the question cannot be decided *à priori*, but requires instead an empirical approach. Only when data are available for various industries will it be possible to make a firmly grounded decision.

V

We have considered thus far construction of an index of collection conditions through special reports relative to collections furnished periodically by business houses to a central agency which compiles the composite figures, but the problem may be approached in another manner. The principal type of credit exchange bureau has as its function the furnishing of reports on the credit standing of accounts which the subscribers or members sell. Upon inquiry by one subscriber, a request for data is sent to the other subscribers, who then give their experience (if any) with the account concerning which inquiry is made. In other words, there is mutual exchange of experiences with the particular account. A variation of this method of operation consists in having the bureau itself "check" the credit of the would-be purchaser. It then keeps the data in its own office and merely advises the subscriber of its conclusions, stating that it would or would not ship the goods. The form employed by the bureau in obtaining information in general among other things calls for (1) the amount owing by the customer to the member, both not yet due and overdue, and (2) the recent payment experience with the customer, whether prompt or slow. These items in fact provide the nucleus for an index of collection conditions. Especially will this be so where data in addition are obtained showing the amount on order by the account, but as yet undelivered. This item gives an indication of merchandising activity in the industry, while the other two items reflect the collection situation. These three items can then be compiled regularly by the credit

exchange bureau from the responses to subscribers' inquiries, and a reflection thus obtained of the collection situation in the field which the bureau embraces.

A considerable number of bureaus of the purely credit exchange type as contrasted with the checking type are in existence today. Some are purely local, operating either among several trades in a given city, or in a large center, within one trade only, while other bureaus operate within a given industry. Certain of the latter are affiliated with trade associations in these industries. Bureaus operating on a national scale, however, are extremely rare. The National Association of Credit Men has developed plans for a bureau on a national scale, which it will institute on January 1, 1921. In 1916 the statement was made by a leading authority that only one such bureau existed, namely, the Credit Clearing House.* This bureau in its *Credit Barometer* covers mainly the apparel and textile lines. The *Barometer* in its weekly and monthly forms is stated to embrace respectively over 50,000 and over 200,000 transactions. Monthly comparisons giving percentage of increase or decrease for the country as a whole and for six sections are made with the previous month, and with the same month during previous years, while weekly comparisons, giving percentage of increase or decrease, are made with last week and the same week last year and two years ago. No definite and continuous series, however, is shown, the nearest approach consisting of a graph depicting the situation for each of the three items for the country as a whole by months since January, 1916, but no scale is attached.

In constructing the barometer, the experiences obtained on each subject of inquiry are added. The three items indicated above are taken, namely, unfilled orders (called "purchase activities"), amount owing, both not yet due and overdue (called "indebtedness") and payment experience, whether prompt or slow (called "payment activities"). It may have appeared above that dollar amounts shown in subscriber's returns would be added. The Credit Clearing House, however, employs the number rather than the volume, and constructs its barometer by dividing the total number of accounts successively into the number of purchases reported, the number of accounts owing, and the number reporting payment experience as prompt. The number of reports varies somewhat from month to month.

In response to an inquiry, it was stated in July, 1919, that

"The number of firms reporting is not always the same, but it is always large enough so that the law of average brings the percentage to a point where we believe it shows the condition, and we have no standard unit at which we stop.

*Ettinger and Golieb, *Credits and Collections*. Second Edition. New York, 1917, p. 137. A description of its operations is given on pp. 137–141.

"The variation from month to month is small. Some months, in the lighter inquiry season or the season when purchases are not being made so heavily, there may be 2,000 or 3,000 experiences less than in months where the buying and inquiring is the heaviest, but this amount, where the experiences are upward of one hundred thousand, cannot play any part in the general percentage average.

"The total number has not increased to any extent since January 1916 except in purchases."

This statement was recently confirmed in conversation with the writer. In connection with an index of this description, the same problems of interpretation of course arise as were indicated above.

It will be observed that in the construction of this type of index data are obtained from individual houses in the ordinary course of business activity. By making the individual purchaser instead of the individual seller the unit about which information is obtained, no additional burden is involved in gathering the information. It is the same with a modification of the method which has been suggested, namely, to obtain from collection agencies data showing the number and volume of accounts placed in their hands for collection. Inasmuch as accounts would not be so treated until the seller had given up hope of himself collecting the account, a reflection would be afforded of the relative volume of absolutely bad accounts. The Credit Clearing House, which also operates a collection service, has recently commenced the compilation of data of this kind, as per the following figures:

1920	*Number*	*Average Size*
June	8,813	$163
July	9,238	172
August	9,964	161

VI

In conclusion the leading points mentioned in the foregoing may be brought together:

1. Two principal methods exist by which an index of collection conditions may be constructed:

(a) Through special reports relative to collections obtained from individual houses by a central agency which prepares composite figures.

(b) Through compilation by a credit exchange bureau of information regularly obtained in the course of its ordinary operations, relative to the credit standing of individual buyers.

2. Great difficulty is experienced in defining the statistical unit to be employed in measuring the status of collections, inasmuch as credit conditions, in particular terms of sale, vary greatly from industry to

industry. These differences are reflected in the methods now employed by individual business houses in following the status of their own collections.

3. Where the problem is approached in the first manner, indicated under (a) above, it would appear best to adapt the method employed to the methods now in use by the individual business house in that industry, varying the method from industry to industry in accordance with the credit conditions peculiar to each. In industries where no relatively standard method is employed, adaptation of the methodology to the records of business houses and to the credit conditions in the industry would be necessary. We thus gain in the more perfect reflection by the index of the collection situation in the given industry, but on the other hand lose in that our data, due to differences in methods of constructing the index in different industries, lack comparability as between these industries.

4. Only one instance has been noted of the construction of an index in the second manner, mentioned above under (b). Reports obtained in this manner, of course, are limited to the credit information given on the blank employed, as use must be made of these items. The principal problems which then arise in its construction relate to the choice of a number of accounts versus quantities in dollars, the construction of a strictly continuous series employing the same firms each month, the selection of the industries to be included, and the method of presenting the index, whether, as in the illustration mentioned above, past due accounts each month be shown as a percentage of total accounts that month, etc. The problems in this connection do not differ greatly from those experienced in the construction of the other type of index with the exception that the field of choice is much narrower, due to the small variety of items with which to work.

5. It would appear that advantageous use might be made of the credit interchange bureau in certain industries. In many, however, it would be necessary to obtain special reports from individual houses relative to the status of collections. More important than the question of choice between these two methods of approach is the actual gathering of data showing the collection situation in order that through careful analysis of the same, conclusions may be reached on the various issues indicated above and the way be paved for an accurate and scientific index of collection conditions.

ON THE COSTS OF TUBERCULOSIS

By Louis I. Dublin, *Metropolitan Life Insurance Company*
and
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This paper is the result of studies made by the Metropolitan Life Insurance Company and the National Tuberculosis Association in order to shed additional light on the question of the economic cost of tuberculosis. Such investigation is a necessary part of the national anti-tuberculosis campaign. Public health work, as now practiced, is often expensive. In the effort to obtain the necessary appropriations with which to carry on their work, health officers are learning to utilize figures showing the economic loss sustained by preventable sickness and premature death in their respective communities. Facts of this kind carry much weight with hard-headed municipal authorities. Altogether, the program of health work is by this means put on a much safer footing. Such figures indicate the relative value of the several types of life conservation work when there is competition between them for public attention. Furthermore, they make it possible to show the character of the returns on the investment when work has been carried on for some time. The health officer who approaches his work from the point of view of the economic factors involved is more likely to keep his feet on the ground and to give a better accounting of his activities.

The first step in our method has consisted in preparing a series of life tables. These show on the one hand, the life expectation including all deaths and on the other, the expectation with tuberculosis excluded. The differences between the life expectation shown in these pairs of tables thus indicate the average number of years of life lost to each individual in a community because of the presence of tuberculosis; and conversely, the average number of years that would be added to the life span if we lived in an ideal community in which deaths from tuberculosis did not occur, and if other causes of death continued at prevailing rates. The method is not a new one. Professor Glover at the International Congress on Tuberculosis held in Washington in 1908 made such a presentation, but based it on the male population of the Registration States for the year 1900. Our purpose was to extend these observations to a later date and to include for comparison a group of insured persons among whom a fairly intensive campaign against tuberculosis had been made. Our material is based accordingly

upon the experience of the millions of insured wage-earners in the Industrial Department of the Metropolitan Life Insurance Company for a period of six years, 1911–16, and upon the facts for the total population of the Registration States as constituted in 1910. This area comprised 21 states and a little over half the population of the entire country. In the insurance experience it was possible to make distinction between the color and sex of the policyholders. In the general population this could not be done and it was necessary, therefore, to limit the study to the population as a whole without finer distinction. The two sets of findings serve as supplements to one another and, as we shall see, confirm in the main the accuracy of the methods* employed and of the results obtained.

The following table shows for each fifth year of age, beginning with age 0 for the group of wage-earners and with age 20 for the general population, the average after-lifetime, both when tuberculosis is present and when it has been completely eliminated as a cause of death.

TABLE I

AVERAGE AFTER-LIFETIME OF SPECIFIED POPULATIONS, WITH AND WITHOUT TUBERCULOSIS—ALL FORMS. BY COLOR AND BY SEX FOR INSURED WAGE-EARNERS, 1911–16 AND FOR TOTAL POPULATION OF REGISTRATION STATES, 1910

Age	Metropolitan Life Ins. Co., industrial policyholders, 1911–16								Population, registration states, 1910	
	White				Colored					
	Males		Females		Males		Females			
	Tbc. present	Tbc. absent	Tbc. present	Tbc. absent	Tbc. present	Tbc. absent	Tbc. present	Tbc. absent	Tbc. present	Tbc. absent
0	46.0	49.5	51.8	54.4	37.2	42.2	38.6	43.7	†	†
5	50.3	54.1	55.2	58.0	45.0	50.6	46.1	51.6	†	†
10	46.1	50.0	51.1	53.8	41.1	46.5	42.4	47.7	†	†
15	41.7	45.5	46.7	49.3	37.1	42.2	38.6	43.3	†	†
20	37.4	41.1	42.5	44.8	33.8	38.2	35.7	39.4	44.2	46.6
25	33.5	36.8	38.5	40.4	30.8	34.4	32.9	35.5	40.3	42.3
30	29.8	32.6	34.7	36.1	27.7	30.6	29.8	31.7	36.5	38.1
35	26.4	28.6	31.0	32.0	24.9	27.1	26.7	28.0	32.7	33.9
40	23.2	24.9	27.3	28.0	21.9	23.6	23.6	24.5	28.9	29.9
45	20.1	21.3	23.5	24.0	19.1	20.3	20.6	21.2	25.2	26.0
50	17.2	18.0	19.9	20.3	16.4	17.2	17.7	18.1	21.6	22.1
55	14.4	14.9	16.4	16.7	13.8	14.4	14.9	15.2	18.1	18.5
60	11.7	12.0	13.3	13.5	11.4	11.8	12.3	12.5	14.9	15.2
65	9.3	9.5	10.6	10.7	9.5	9.7	10.1	10.2	11.9	12.1
70	7.3	7.4	8.4	8.5	7.7	7.9	8.0	8.1	9.4	9.5
75	5.7	5.8	6.7	6.7	6.4	6.5	6.3	6.4	7.1	7.2
80	4.6	4.6	5.1	5.1	5.4	5.5	5.3	5.3	5.3	5.4
85	3.6	3.6	4.0	4.0	4.5	4.5	4.5	4.5	4.0	4.0
90	2.9	2.9	3.0	3.0	4.0	4.0	4.1	4.1	2.9	2.9
95	2.4	2.4	2.4	2.4	3.1	3.1	3.2	3.2	1.9	1.9

The loss of expectation of life due to tuberculosis is the difference between the corresponding figures in Table I at each age and is shown in the following table:

* A statement of the methods employed is presented in the Appendix, pp. 66.

† Data not computed.

TABLE II

LOSS IN YEARS OF AVERAGE AFTER-LIFETIME DUE TO TUBERCULOSIS—ALL FORMS

Age	Metropolitan Life Ins. Co., industrial policyholders, 1911–16				Population, registration states, 1910
	White		Colored		
	Males	Females	Males	Females	
0	3.5	2.6	5.0	5.1	*
5	3.8	2.8	5.6	5.5	*
10	3.9	2.7	5.4	5.3	*
15	3.8	2.6	5.1	4.7	*
20	3.7	2.3	4.4	3.7	2.4
25	3.3	1.9	3.6	2.6	2.0
30	2.8	1.4	2.9	1.9	1.6
35	2.2	1.0	2.2	1.3	1.2
40	1.7	.7	1.7	.9	1.0
45	1.2	.5	1.2	.6	.8
50	.8	.4	.8	.4	.5
55	.5	.3	.6	.3	.4
60	.3	.2	.4	.2	.3
65	.2	.1	.2	.1	.2
70	.1	.1	.2	.1	.1
75	.1	..	.1	.1	.1
80	..	..	.1	..	.1
85	..	..	..	..	..
90	..	..	..	..	..
95	..	..	..	..	..

The importance of the disease is indicated by the extent to which it shortens the average span of human life. Among insured wage-earners tuberculosis is a very powerful anti-longevity force. White males lose 3.5 years in all, or 7.6 per cent of their entire expectancy; white females, 2.6 years or 5 per cent of their expectancy. The heaviest losses occur among the colored people. Colored males and females lose an average of about 5 years of life because of the inroads of this disease, or 12.0 and 13.2 per cent, respectively. On the whole, males lose more heavily than females from tuberculosis. The slightly greater loss among colored females at age 0 is due to the high tuberculosis death rates prevalent among them under age 5; later in life the colored males show much greater losses than do colored females.

There is a gradual decrease with advancing age in the number of years of life lost on account of tuberculosis. Thus at age 20, when productive life is well started for most people, tuberculosis reduces the expectancy 3.7 years among white males, 2.3 years among white females, 4.4 years among colored males, and 3.7 years among colored females. At age 40, the years lost are from one-third to one-half as many as at age 20, and at age 60 and thereafter the losses cease to have an important effect upon longevity although the death rates from tuberculosis continue to be high, even at these advanced ages.

The loss in years of life is obviously greater among insured wage-earners than among the general population because tuberculosis death

* Data not computed.

rates are uniformly higher among the industrial groups. But even in the general population the loss in years is 2.4 at age 20, 1 at age 40, and 0.3 of a year at age 60.

The extent of the damage from tuberculosis appears to be closely associated with the life expectancy of the population in question whether we consider tuberculosis as a factor in mortality or entirely eliminate it. The loss from tuberculosis is high where longevity is low and is low where longevity is high. Thus at age 0, tuberculosis decreases the span of life 3.5 years for insured white males, but only 2.6 years among the longer lived white females, and about 5 years among the much shorter lived colored policyholders. The coefficient of correlation between longevity and the loss of longevity due to tuberculosis, based upon one hundred observations among insured wage-earners, is 0.791 ± 0.076.

TABLE III

TABLE FOR 100 OBSERVATIONS* AMONG INSURED WAGE-EARNERS, 1911-16, OF THE METROPOLITAN LIFE INSURANCE COMPANY, SHOWING CORRELATION BETWEEN LONGEVITY AND LOSS IN LONGEVITY FROM TUBERCULOSIS

		Longevity		Totals
		Low	High	
Loss in Longevity	High	a 43.5	b 7	a+b 50.5
	Low	c 15.5	d 34	c+d 49.5
	Totals	a+c 59	b+d 41	N 100

This suggests that the conditions of constitution and environment which determine the mortality from tuberculosis also in a measure determine the death rates from other important causes. Another possibility which must be considered is that the amount of mortality from tuberculosis may be determined by the prevalence of certain diseases which like typhoid fever, malaria, hookworm, and syphilis, undermine resistance; and that, conversely, tuberculosis, when prevalent, helps to impair physical vigor and thus increases the death rate from the so-called "degenerative diseases," such as heart disease, Bright's disease, and arteriosclerosis. All three factors are probably at work in different degrees in different communities. Tuberculosis

* The 100 Observations consisted of 25 random ages for the series White Male, White Female, Colored Male, and Colored Female. The dividing lines between high and low for any series were furnished by the average longevity and the average loss in longevity from tuberculosis respectively, for that particular series.

does not stand isolated but is closely bound up with environmental conditions on the one end and constitutional factors on the other, being determined by and determining the rate of loss from other diseases. This question is being attacked by means of a study of the losses of longevity from other important causes and will be reported upon at a later date.

Our next step was to express the losses in expectation described above in terms of estimated money losses. The importance of tuberculosis as a factor in national economy is in this way brought home more sharply. After an examination of the available data on wealth, income, and production in the United States, we concluded that a loss of one year of life was equivalent to a money loss of not less than $100 in national wealth. This conclusion was submitted to a group of economists who have busied themselves with such questions and they confirmed this estimate as in accordance with the best data available. We may say, therefore, that each year of life expectancy lost from tuberculosis by the population of the United States represents a loss of $100 in national wealth. In view of the fact that tuberculosis mortality cuts approximately two and one-half years from the complete life expectation of every individual under present mortality conditions, the loss per person is at least $250. This, in a population of approximately one hundred and six millions, represents a loss of twenty-six and a half billions of dollars. The present generation would add that much more net wealth if tuberculosis were not a factor in mortality. Since the average lifetime is approximately fifty years in the United States, this loss means an annual charge in excess of five hundred million dollars from the curtailed longevity of individuals because of tuberculosis.

No consideration has as yet been given to the very large additional losses which result from the long periods of sickness due to tuberculosis. The losses from disability for work, the cost of medical, nursing, and extra dietary and other care, add very materially to the figures quoted above. It is not possible for us at this time to offer even an estimate of this loss. The amount is enormous. One of us in a study of the records of the Association for Improving the Condition of the Poor (New York City), which has for a number of years conducted intensive relief measures for the care of tuberculous families, found that a tuberculous family was under care, on the average, for a period of two years, four and one-half months, and that during this time the families suffered a wage loss of $836 and the Association contributed $1,181 in relief and care. These data are not sufficient in themselves to determine the community loss in tuberculous families, but they suggest how much

the items will be when more extensive and more detailed information becomes available.

Our study has shown the important part that tuberculosis plays as a factor in modern economic life. The amount of damage done is great enough to justify large expenditures for the control of tuberculosis as a cause of sickness and death. The tuberculosis death rate has declined and is still declining. Among industrial policyholders of the Metropolitan Life Insurance Company the death rate has in recent years been reduced very rapidly. In this organization special efforts have been made to instruct the great body of policyholders in methods of preventing and combating the disease, apparently with good results. The death rate from tuberculosis of the lungs in the entire experience has declined 30.3 per cent between 1911 and 1919. During 1920, to date, the experience is reaching low figures previously thought to be unattainable. In fact, the tuberculosis death rate of insured wage-earners is now almost as low as in the general population, although ten years ago there was an excess of 41 per cent in the death rate among these people as compared with that of the general population. In view of the complexity of the problem it is not possible to measure with any exactness the direct relation between the various efforts expended and the results obtained by the anti-tuberculosis campaign. Yet the results are indicative that the work has borne fruit. These achievements clearly call for a continuance of the anti-tuberculosis program along the lines now being followed.

Appendix

Method of constructing and graduating the insurance* tables

Method of construction

The number of lives exposed to risk, the number of deaths from all causes and from all forms of tuberculosis, were obtained from the public health statistical records of the Industrial Department for the years 1911 to 1916. A complete tabulation of the deaths according to color, sex, and age is shown in a publication by the Metropolitan Life Insurance Company, entitled "Mortality Statistics of Insured Wage-Earners and Their Families." In these tables, age distinctions are shown by single ages under 5 years and by 5-year groupings up to the group "75 years and over." The data were graduated by interpolation formulae and these processes were applied to the exposures and to the deaths from all causes and from tuberculosis—all forms.

The pivotal values were obtained by means of Formula I. The q_x

* The mathematical work of this paper was carried out by Mr. Frank Langellotti, formerly of the Statistical Bureau of the Metropolitan Life Insurance Company.

values were computed by means of Formula II, formula (a) being used for all causes of death and (b) for tuberculosis. The differences were tabulated as far as and including the fifth difference and the intermediate q_x was derived by the osculatory interpolation Formula III. The q_x values beyond age 70 were obtained by Formula IV. (For tuberculosis beyond age 75, the insurance figures were adjusted in accordance with the general age trend of mortality from tuberculosis—all forms, in the data of the registration area of the United States.) For both, all causes of death and tuberculosis, the values for single ages, 0 to 1, were computed by Formula V. The q_x values for ages 2, 3, and 4 are ungraduated, while those for ages 5 and 6 were computed by Formula VI. Two life tables were constructed, the one based upon the q_x values for all causes of death and the other, upon q'_x in which the q'_xs for tuberculosis—all forms were eliminated.

The tetrachoric coefficient of correlation and its probable error were obtained by VII and VIII respectively.

Formulae

$$u_{x+7} = \cdot 2w_{x+5} - .008\Delta^2 w_x \qquad \text{(I)}$$

where

$$w_x = u_x + u_{x+1} + \ldots . + u_{x+4}$$

$$q_x = \frac{\theta_x}{L_x + \frac{1}{2}\theta_x} = \frac{\theta_x}{l_x} \qquad \text{(a)} \qquad \text{(II)}$$

$$q'_x = \frac{\theta'_x}{l_x} \qquad \text{(b)}$$

where θ_x represents deaths, L_x the mean population, both for age x to $x+1$; and the prime signifies tuberculosis.

$$u_{x+n'} = u_x + n\Delta u_x + \frac{n(n-1)}{2}(\delta^2 u_{x+5} - 1/6\delta^4 u_{x+5}) + \frac{n(n-1)(n-2)}{6}(\delta^3 u_{x+5/2} - 1/6\delta^5 u_{x+5/2}) \qquad \text{(III)}$$

where the δ's are central differences, n' is the interpolation interval, and n is n' divided by the tabular interval.

In terms of ordinary differences (III) becomes

$$u_{x+n'} = u_x + n\Delta u_x + \frac{n(n-1)}{2} \cdot (\Delta^2 u_x - 1/6\Delta^4 u_{x-5}) + \frac{n(n-1)(n-2)}{6} \cdot (\Delta^3 u_{x-5} - 1/6\Delta^5 u_{x-10}) \qquad \text{(III')}$$

$$\Delta q_{70+x} = \Delta q^{G}_{70+x} \cdot \frac{q^{G}_{105} - q_{70}}{q^{G}_{105} - q^{G}_{70}} \qquad \text{(IV)}$$

where G signifies Glover's City Table in case of white and Registration States Table in case of colored

$$\left.\begin{aligned} q_{70+x} &= q_{70+(x-1)} + \Delta q_{70+(x-1)} \\ q_0 &= \frac{q_2}{q^{G}_{2}} \cdot q^{G}_{0} = k q^{G}_{0} \\ q_1 &= k q^{G}_{1} \end{aligned}\right\} \qquad \text{(V)}$$

where G means the same as in (IV)

Lagrange's formula:

$$\begin{aligned} q_x = q_a &\cdot \frac{(x-b)(x-c)\ \ldots\ (x-n)}{(a-b)(a-c)\ \ldots\ (a-n)} \\ + q_b &\cdot \frac{(x-a)(x-c)\ \ldots\ (x-n)}{(b-a)(b-c)\ \ldots\ (b-n)} \\ + &\ \ldots\ldots\ldots\ldots \end{aligned} \qquad \text{(VI)}$$

$$\left.\begin{aligned} r &= \sin\left(\frac{\pi}{2} \cdot \frac{1}{(1+K^2)^{\frac{1}{2}}}\right) \\ K^2 &= \frac{4\ abcdN^2}{(ad-bc)^2(a+d)(b+c)} \end{aligned}\right\} \qquad \text{(VII)}$$

$$pe_r = 3\left(.6745\frac{1-r^2}{\sqrt{n}}\right) \qquad \text{(VIII)}$$

I, II, III, and VI may be found in *Actuarial Studies No. 4*, published by the Actuarial Society of America; VII, in Davenport's *Statistical Methods;* and VIII, in Elderton's *Frequency Curves and Correlation.*

METHODS OF CONSTRUCTING AND GRADUATING THE REGISTRATION AREA TABLES

The methods of graduating the data for the population of the registration area of the United States were as follows. The mean population (L_x) at quinquennial intervals was computed by Formula I. The number of deaths, both from all causes and from all causes excepting tuberculosis—all forms, were similarly treated. The pivotal central death rates obtained by Formula IX were transformed into q_x values by means of Formula X. For the pivotal values of q_x

beyond age 87, a constant fourth difference was calculated from Formula XI and applied continuously to obtain the lower differences and finally the q_x values themselves. The intermediate q_x values were derived by means of the osculatory Formulae XII and XIII. The former was used for the age range, 22 to 82 years, and the latter for the portions from ages 17 to 22 and from 82 to 97 years. The q_x values at ages 98, 99 and 100 were derived by means of the constant third and fourth single-year differences from Formula XIV. From ages 5 to 17, the computations were obtained from Formula XV by applying the differences upwards.

Formulae

$$m_x = \frac{\theta_x}{L_x} \tag{IX}$$

$$q_x = \frac{2m_x}{2+m_x} \tag{X}$$

$$\Delta^4 q_{72} = \frac{1}{25.5024}(q_{105} - q_{72} - 6.6\Delta q_{72} - 18.48\Delta^2 q_{72} - 28.336\Delta^3 q_{72})$$

in which q_{105} is assumed to be unity (XI)

$$\begin{aligned}
\nabla u_{x+10} &= \left(\frac{\Delta}{5} + \frac{8}{5^2}\Delta^2 + \frac{11}{5^3}\Delta^3 - \frac{11}{5^4}\Delta^4 + \frac{\Delta^5}{5^4}\right)u_x \\
\nabla^2 u_{x+10} &= \left(\frac{\Delta^2}{5^2} + \frac{6}{5^3}\Delta^3 + \frac{\Delta^4}{5^4} + \frac{3}{5^4}\Delta^5\right)u_x \\
\nabla^3 u_{x+10} &= \left(\frac{\Delta^3}{5^3} + \frac{4}{5^4}\Delta^4 - \frac{3}{5^4}\Delta^5\right)u_x \\
\nabla^4 u_{x+10} &= \left(\frac{1}{5^4}\Delta^4 - \frac{2}{5^4}\Delta^5\right)u_x \\
\nabla^5 u_{x+10} &= \frac{1}{5^3}\Delta^5 u_x
\end{aligned} \tag{XII}$$

where ∇ signifies single-year differences

$$\begin{aligned}
\nabla u_{x+5} &= \left(\frac{1}{5}\Delta + \frac{3}{25}\Delta^2 - \frac{2}{125}\Delta^3\right)u_x \\
\nabla^2 u_{x+5} &= \left(\frac{1}{25}\Delta^2 - \frac{2}{125}\Delta^3\right)u_x \\
\nabla^3 u_{x+5} &= \frac{3}{125}\Delta^3 u_x
\end{aligned} \tag{XIII}$$

$$\nabla^3 q_{95} = \frac{1}{90}(6q_{102} - q_{105} - 5q_{95} - 32\nabla q_{95} - 81\nabla^2 q_{95})$$
$$\nabla^4 q_{95} = \frac{1}{35}(q_{102} - q_{95} - 7\nabla q_{95} - 21\nabla^2 q_{95} - 35\nabla^3 q_{95}) \quad \text{(XIV)}$$

using this value as a constant

$$\nabla^2 q_{18} = \frac{1}{1365}(143q_{12} - 10q_5 - 133q_{18} - 728\nabla q_{18})$$
$$\nabla^3 q_{18} = \frac{1}{20}(q_{12} - q_{18} - 6\nabla q_{18} - 15\nabla^2 q18) \quad \text{(XV)}$$

using this value as a constant.

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THE EFFECTS OF VARYING THE RATE OF THE TAX ON SPIRITS

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The history of the spirits tax in the United States shows the tax to have been one of extremely varying rate. Fluctuating from 20 cents to $2 per gallon in the Civil War,* the tax was finally reduced to 50 cents in 1868.† In 1872 it was raised to 70 cents,‡ in 1875 to 90,§ and in 1894 to $1.10.‖ It remained at this figure until the recent war when, in 1917, it became $2.10 for non-beverage spirits and $3.20 for the beverage article,¶ and in 1919, rose to the unprecedented figure of $6.40 for drinkable spirits and $2.20 for spirits used for other purposes.** The rates appear to have been the result of legislative caprice, and surely were not arrived at through any scientific study of the problem. It is interesting, therefore, to see if Congress and the officials did hit upon the most satisfactory rates; and, in particular, whether the rates adopted were designed to yield the largest public revenue.

In analyzing the effects of the rates of the spirits tax, history is helpful; but too much emphasis should not be given to the results of the Civil War rates. The experience of any one period is not sufficient to determine what may be the maximum revenue point in the taxation of a commodity. David A. Wells, who wrote much in his day about the taxation of spirits, was, in the opinion of the writer, guilty of this error. In 1893, in a letter to Secretary Carlisle who had asked him whether it was his opinion that the 90-cent rate should be raised, Wells wrote that there should be no change in the tax, citing in support of his position (among other facts) the results of the Civil War.†† He asserted that it was shown in the sixties that the spirits tax should not be made too high, pointing out that the revenue increased greatly after the reduction of the rate in 1868 to 50 cents. But reasoning on the basis of the past does not settle the question of what the rate should be for the future, nor can the results of the Civil War tell us whether

* Act of July 1, 1862, 12 U. S. Stat. at Large, p. 447—20 cents; Act of March 7, 1864, 13 U. S. Stat. at Large, p. 14—60 cents; Act of June 30, 1864, 13 U. S. Stat. at Large, p. 243—$1.50 for the period up to February 1, 1865; after that date, $2; Act of December 22, 1864, 13 U. S. Stat. at Large, p. 420, by which the date on which the $2 rate was to go into effect was changed to January 1, 1865.

† Act of July 20, 1863, 15 U. S. Stat. at Large, p. 125.

‡ Act of June 6, 1872, 17 U. S. Stat. at Large, p. 238.

§ Act of March 3, 1875, 18 U. S. Stat. at Large, p. 339.

‖ Act of August 28, 1894, 28 U. S. Stat. at Large, p. 563.

¶ Act of October 3, 1917, 40 U. S. Stat. at Large, p. 309.

** Act of February 24, 1919, 40 U. S. Stat. at Large, p. 1105.

†† Finance Report for 1893, pp. 1104–1109. Letter of D. A. Wells to Secretary Carlisle dated July 8, 1893.

the later rates were as high as they should have been. What was an inexpedient tax at one period might have been satisfactory at another. Conditions in 1893 were very different from those in the Civil War. The administrative machinery of the internal revenue department was much more efficient, the standard of public service was higher, the public demanded better performance on the part of officials, conditions of production had changed, and it was easier to collect the tax from large-scale producers than from small distillers.* One must look, then, to facts other than the experience of the Civil War in order to decide whether the tax on spirits was as high as it could have been profitably.

One cannot decide on the rate of tax that will yield the maximum revenue in the case of any commodity without examining the effect of its taxation upon its consumption. If by raising prices taxes reduce consumption, it is important to fix the rates low enough not to curtail revenue but not so low as to lose receipts. In the case of commodities possessing an elastic demand, there is a maximum revenue point which ought to be discovered by the government. Unfortunately, the relation of the taxation of spirits and their consumption has been little studied in this country, and on this point it will be very difficult to reach any conclusion. During the Civil War David A. Wells published his results of a study of spirits consumption in the *Report of the Special Revenue Commission*, of which Commission he was chairman.† He later brought this study up to 1879.‡ His general conclusion seems to be that taxation seems to have very little permanent effect upon consumption although there may be some temporary reduction. There is warrant, therefore, for examining the statistics of consumption in the light of the whole experience.

In Table I is given the total and per capita consumption of spirits in the United States for various years. These figures are taken from the *Statistical Abstract of the United States*, but they must be used with great caution. The annual consumption by the population is arrived at by adding to the quantity of home spirits withdrawn for use the amount of foreign imported goods less the exports of the domestic product. The per capita figure is then obtained by dividing this total by the estimated population for that year. However, the apparent consumption indicated by the net quantity imported plus the quantity withdrawn at home may not equal the quantity actually used in the

* Howe, F. C.: *Taxation and Taxes in the United States under the Internal Revenue System*, p. 230. The author points out that Wells was not warranted in condemning a higher tax in later years because one so high was not successful under earlier conditions.

† Special Report No. 5 of the Revenue Commission, p. 187.

‡ *Cf.* his article in the *Princeton Review*, July, 1884, pp. 87–104, and reprinted in his *Practical Economics*, pp. 180–193. It would be an interesting contribution to economic literature if a special study were made of the relation of the taxation of alcoholic drinks to their consumption.

TABLE I

CONSUMPTION OF DISTILLED SPIRITS* IN THE UNITED STATES, 1863–1918.

Year	Total consumption	Per capita	Year	Total consumption	Per capita
1863	17,409,596	.52	1891	91,157,565	1.43
1864	87,002,067	2.55	1892	97,301,840	1.49
1865	17,484,302	.50	1893	101,287,753	1.52
1866	15,577,386	.44	1894	90,541,209	1.34
1867	15,885,460	.44	1895	78,655,063	1.14
1868	8,453,485	.23	1896	70,725,745	1.01
1869	63,443,582	1.68	1897	73,029,948	1.02
1870	79,895,708	2.07	1898	81,594,293	1.12
1871	64,059,661	1.62	1899	87,433,442	1.18
1872	68,422,280	1.68	1900	97,356,864	1.28
1873	68,037,139	1.63	1901	103,455,338	1.31
1874	64,540,090	1.51	1902	107,726,141	1.34
1875	66,120,558	1.50	1903	117,669,954	1.43
1876	59,983,890	1.33	1904	121,087,387	1.45
1877	59,420,118	1.28	1905	120,869,649	1.42
1878	51,931,941	1.09	1906	127,851,583	1.47
1879	54,278,475	1.11	1907	140,084,436	1.58
1880	63,526,694	1.27	1908	125,379,314	1.39
1881	70,607,081	1.38	1909	121,130,036	1.32
1882	73,556,976	1.40	1910	133,138,684	1.42
1883	78,452,687	1.46	1911	138,585,989	1.46
1884	81,128,581	1.48	1912	139,496,331	1.44
1885	71,416,709	1.27	1913	147,745,628	1.50
1886	73,229,114	1.28	1914	143,447,227	1.43
1887	71,072,794	1.21	1915	127,159,098	1.25
1888	75,845,352	1.26	1916	139,973,684	1.35
1889	80,613,158	1.32	1917	167,740,325	1.60
1890	87,829,623	1.40	1918	119,926,258	1.12

United States. There are three possible reasons for this. First, in those years which preceded or were marked by an increase in the rate, large quantities of spirits were manufactured and withdrawn to escape the payment of the larger tax and sold at the advanced price, with the result that the number of gallons of spirits paying tax were in excess of the amount used in those years. Moreover, when such large quantities of spirits were taken out in periods immediately preceding an alteration in the tax, smaller amounts than usual were withdrawn in years subsequent to the change. The consumption figures based on withdrawals for such years before and after a change in the tax do not show the actual quantity of spirits used. For this reason one must discard entirely or use with great caution the data for years immediately affected by rate changes.

The second explanation of the possible disparity between the annual withdrawals and the actual consumption lies in the peculiar administrative provision of the law which required that within a definite number of years after spirits were admitted to a bonded warehouse they should be withdrawn.† This requirement frequently necessitated the

* *Statistical Abstract of the United States for 1918*, p. 825.

† Before 1868 the tax was paid on spirits as it went into consumption without any limitation on the time within which the tax should be paid. By the Act of 1868 the time during which spirits could go without payment of the tax by storage in bonded warehouses was limited to one year (Act of July 20, 1868, 15 U. S. Stat. at Large, p. 136). In 1878 the bonded period was extended to three years (1 U. S

withdrawal of goods when they were not demanded or needed,* with the result that a certain portion of the spirits annually withdrawn might not have been actually consumed in the year in which it was taken out. There is, unfortunately, no way of telling how much deduction should be made from the annual consumption figures to eradicate this error. But inasmuch as this error may be common to figures for all the years, the value of the per capita data for comparative purposes is not destroyed. A third reason for a possible difference between the actual and apparent consumption of spirits is that the official calculations of the quantity used do not take any account of whisky illicitly manufactured and consumed. But it is probable that the latter does not form a large portion of the liquor used. For these reasons one must be on guard in using the available consumption figures, although the errors which they involve do not vitiate them too much to serve our purpose.

What, then, do these figures show to be the effect of the taxation of spirits upon its consumption? The first significant change in consumption came in 1869 following the reduction in the tax from $2 to 50 cents. In this year, the consumption increased to 1.68 gallons per capita from .23 in the previous year. But this apparent increase cannot be wholly attributed to the change in the rate, for it doubtless was partly due to the more effective system of administration provided by the new law. At any rate the consumption was not appreciably lessened by the increase in the tax to 70 cents in 1872, especially in view of the fact that consumption after a change may be less than normal merely because of the larger withdrawal preceding the change. The increase in the rate to 90 cents in 1875 reduced consumption for a time, but within seven or eight years the per capita quantity of spirits used had again risen almost to its former level, the average amount during the eighties being 1.33 and during the nineties 1.27 as compared with 1.51 in 1874, the year before the change in the rate. The advance in the tax apparently did not effect any great permanent reduction in consumption.

Stat. at Large, p. 249). Finally, in 1894, the period of storage, tax-free, was lengthened to eight years (Act of August 27, 1894, 28 U. S. Stat. at Large, p. 563). Spirits were thus for a long time treated differently from tobacco and beer for which no limited bonded period was fixed. These commodities were allowed to remain in bonded warehouse for an indefinite period, being withdrawn at the will of the owner on payment of the tax.

* At times large quantities of spirits were exported from the United States tax-free and, stored abroad, were later brought back for sale when demand increased, thus delaying the payment of the tax until actual sale of the goods. The tax was paid when the goods returned to the United States. In this way, the manufacturers of spirits were saved the interest on the taxes which would otherwise have been paid before the goods were sold because of the expiration of the bonded period. *Cf* the *Report of the Industrial Commission*, vol. I, pt. I, p. 93; also *House Report, No. 4165, Fiftieth Congress, Second Session*, p. 9 (The Whisky Trust Hearing). Reference is made also to the unpublished thesis of the writer on "Taxation of Distilled Spirits in the United States," now in the Widener Library, Harvard University.

In 1894 the tax was raised to $1.10 and for some time afterwards the consumption fell off, reaching in 1896 the lowest point since the days of the Civil War frauds,* but in the next decade the quantity of spirits consumed per head again mounted to figures as high as those for some years under the 90 cent tax.† In fact, consumption throughout the two decades after 1900 was almost uniformly large, notwithstanding the fact that the tax rate was the highest it had been since the Civil War.‡ It should be remembered also that the figures after 1906 were reduced by the prohibition movement which set in about that time and steadily grew in strength. This is another reason why the per capita figures for the years since 1906 do not accurately show the effect of taxation. Doubtless under the same taxes, without prohibition, per capita consumption would have been larger.

It is also worth considering whether the relatively light taxation of beer that could be used as a substitute for spirits did not result in a smaller consumption of the latter than might have been the case if a higher tax had been paid throughout this period on fermented liquors. At any rate, Table II shows that from 1863 to 1918 the consumption of beer experienced a tremendous increase, rising from less than 2 gallons per capita to more than 20. Undoubtedly the consumption of spirits would have been greater if that of beer had been less, and this fact raises the question as to whether a higher tax on the latter would not have increased the consumption of the former, and at the same time expanded the receipts from both.

The effect of taxation upon the consumption of spirits has been a debatable question in other countries. The matter was considered in the *Report of the Board of Trade of the United Kingdom* in 1897, but no very definite conclusion was reached. The Board found it difficult to believe that taxation had absolutely no permanent effect on consumption and stated that under increased taxation the amount consumed

*It is probable that the general depression of the nineties in some part accounts for the decrease in consumption.

†This increase perhaps was due to some extent to the increasing prosperity.

‡The consumption figures since 1907 do not include denatured alcohol consumed in arts and manufactures and are, therefore, smaller than they might have been. Spirits so used were counted in the quantity consumed before 1907. The quantities of denatured alcohol consumed annually since 1907 are as follows:

1907	3,084,951	1913	16,953,553
1908	5,640,331	1914	17,811,078
1909	7,967,736	1915	25,411,719
1910	10,605,871	1916	84,532,253
1911	11,682,888	1917	93,762,423
1912	13,955,904	1918	90,644,723

The tax undoubtedly retarded the use of spirits in industry, but it could be so used only if tax-free, and this fact does not, therefore, affect the revenue problem.

TABLE II

CONSUMPTION OF BEER IN THE UNITED STATES, 1863–1918. (UNIT=1 GALLON)

Year	Total consumption	Per capita	Year	Total consumption	Per capita
1863	62,372,465	1.87	1891	947,230,519	14.84
1864	97,770,584	2.87	1892	989,309,832	15.24
1865	113,623,255	3.27	1893	1,074,441,071	16.19
1866	159,153,746	4.49	1894	1,036,023,535	15.32
1867	193,060,149	5.33	1895	1,043,033,486	15.13
1868	191,289,305	5.17	1896	1,113,465,966	15.85
1869	197,483,238	5.23	1897	1,069,640,208	14.94
1870	204,756,156	5.31	1898	1,164,500,101	15.96
1871	241,138,127	6.10	1899	1,136,380,908	15.30
1872	270,298,916	6.66	1900	1,222,387,104	16.09
1873	300,697,262	7.21	1901	1,259,060,444	15.98
1874	299,521,065	7.00	1902	1,382,369,176	17.18
1875	294,953,157	6.71	1903	1,450,308,350	17.67
1876	308,336,387	6.83	1904	1,499,378,215	17.91
1877	304,926,667	6.58	1905	1,538,526,610	18.02
1878	317,969,352	6.68	1906	1,700,421,221	19.54
1879	344,605,485	7.05	1907	1,822,313,525	20.56
1880	414,220,165	8.26	1908	1,828,732,448	20.26
1881	444,112,169	8.65	1909	1,752,634,426	19.07
1882	526,379,980	10.03	1910	1,851,666,658	20.09
1883	551,497,340	10.27	1911	1,966,911,754	20.66
1884	590,016,517	10.74	1912	1,932,531,184	19.96
1885	596,102,038	10.62	1913	2,030,347,372	20.62
1886	643,179,459	11.21	1914	2,056,407,108	20.54
1887	717,972,313	12.24	1915	1,855,524,284	18.24
1888	766,491,812	12.78	1916	1,818,275,042	17.59
1889	780,122,461	12.73	1917	1,885,071,304	17.95
1890	855,929,559	13.67	1918	1,556,378,953	14.59

would be less for a time in any case.* Mr. Bence-Jones, who did the statistical work underlying this report, read a paper before the Royal Statistical Society in 1900 in which he stated that apparently it was the experience of certain countries that in times of prosperity more alcoholic drinks were consumed than in periods of depression.† He did not, however, touch the question of the effect of taxation on consumption. Professor Edgeworth in discussing this paper raised the question whether the alleged connection between large consumption and prosperity did not point to the fact that the demand for alcoholic beverages was elastic, and whether, if that were true, taxation would not affect consumption.‡ Shadwell in a careful study of consumption of spiritous liquors in the United Kingdom reaches the conclusion that by taxation it is possible to exercise considerable control over consumption as long as the rate is not made high enough to force illicit traffic.§

* *Cf. Statement of the Board of Trade* showing the production and consumption of alcoholic beverages in the various countries of Europe and the United States. Parliamentary Papers, 1897, vol. 79, p. 5. This report stated that consumption seemed to vary with the condition of prosperity in a nation, increasing in "good" times, and decreasing in "bad."

† *Statistical Journal of Royal Statistical Society*, vol. 63 (June, 1900), pp. 272–288. *Cf.* also the *Report of the Board of Trade* cited above.

‡ *Statistical Journal*, vol. 63, p. 290.

§ Shadwell, *Drink, Temperance, and Legislation*, p. 152. The effect of taxation on consumption of alcoholic liquor in the United Kingdom had been studied in 1875 by the Rev. Dawson Burns who read a paper upon that subject before the Royal Statistical Society in that year. His conclusion was that

The question was studied in France in the eighteen-nineties by a Committee of the Chamber of Deputies charged with investigating a proposal to create a state monopoly of rectifying alcohol. The Committee examined various schemes for mitigating the alleged deleterious influence of the consumption of alcohol upon the welfare of the people. One of the proposals for meeting the condition was that the consumption of spirits should be curtailed by higher taxation. The Committee after examining the statistics of consumption declared that in the nineteenth century taxation had had no effect on the quantity of alcoholic drink used.* In 1830, when the tax was 55 francs per hectoliter, the consumption was 1.12 liters per capita, but in 1831 after the tax was decreased to 37.4 francs, the per capita consumption itself declined to 1.09 liters. Again, in 1855, the consumption per head stood at 2 liters, and although by the law of July 14, 1855, the tax was raised to 60 francs, the quantity used increased to 2.13 liters. The rate was moved up to 90 francs in 1860, but in that year the amount consumed was 2.27, although it was only 2.23 the year before. Although the tax rose again by the law of September 1, 1871, the per capita quantity used in 1872 was 2.09 liters as against 2.81 the year before. The law of December 30, 1873, increased the spirits tax to 156.25 francs and added some special taxes on liqueurs, absinthes, and the like, but in 1875 the per capita consumption had increased to 2.82 liters. It may be objected that the data for sample years which happen to come before and after a change in the rate give no indication of the permanent effect of alterations in the tax. But the statistics of consumption for every year from 1850 to 1895 were given by the Commission,† and from these data that body concludes that throughout that period the national taxes did not affect consumption and that the quantity of drink used did not vary with its price,‡ which would tend to show that the product in that country at least possessed an inelastic demand. This unqualified conclusion is perhaps unwarranted, for doubtless the changes in the tax had some effect on consumption, though it may not have been great.§

taxation of strong drink decreased its consumption, based upon the experience in the United Kingdom. His paper, however, was very severely criticised by others present who had given attention to the subject and believed that the facts did not warrant any such conclusion. *Cf. Journal of the Royal Statistical Society*, March, 1875, vol. 38. pp. 1–32.

* *Rapport Seance du 19 Janvier, 1897.* Chambre des Deputes. Appendix No. 2212, Documents Parlementaires, 1897, vol. I, p. 145.

† *Report of the Commission*, Documents Parlementaires, 1897, Part I, p. 145.

‡ *Ibid.*, p. 145. "Nous pouvons donc hardiment déclarer que ni l'augmentation des droits sur l'alcohol ni un relevement du prix de cette denrée ne suffiraient pour en diminuer la consommation."

§ See above where the position of the Board of Trade on this point was referred to. In the report of the Board (1897) it was stated that it was difficult "altogether to subscribe to the opinion of the French Committee that no increase in the amount of such taxation will have the effect of permanently diminishing the consumption."

There were cited other examples also of the fact that increased taxes did not result in decreased consumption. In 1889, the city of Marseilles increased its octroi duties considerably on alcoholic liquors, but without any effect on their consumption. In fact an increase in revenue followed the change. At one time also in Belgium the spirits tax was raised tenfold, and yet an increase in consumption followed.*

However the matter may be with foreign countries, in America at least the history of spirits taxation shows that, although there was always a temporary reduction in consumption after an increase in the tax, no marked permanent decline in the use of spirits followed advances in the rate. The experience would seem to show that in the long run American spirits possess to some extent an inelastic demand, although there are temporary variations in demand. There was undoubtedly a point above which the government could not go in fixing the rate of the tax, but evidently that point had not been reached. On the basis of the data it would be hard to tell where this point was. Yet the observation is significant from the point of view of revenue because apparently considerably higher taxes might have been laid on spirits for a number of years during the existence of the tax without reducing the consumption so much as not to bring an increased revenue.† It may be said, however, that no such conclusion is warranted from a study of statistics of consumption which do not include the amount of illicit spirits consumed.‡

The objection may be raised that higher taxes would result in frauds and that even if consumption were not reduced, much of the spirits consumed under the higher rates would have been produced in illicit stills and used or sold without payment of the tax, with the result that the treasury might have got no more or even less revenue under the higher rates although as much liquor was consumed as before the increase in the tax. This leads to an examination of the effect of increased taxes on frauds and illicit distilling. The available statistics concerning illicit distilling consist of the number of officers and subordinate employees of the Internal Revenue Service killed and wounded, and the number of seizures of distilleries engaged in violation of the law. These figures do not measure the quantity of spirits unlawfully manufactured, but they are the only data that indicate the extent of the illicit operations. The statistics begin with the year 1877 at which time the Bureau of Internal Revenue began its intensive campaign against illicit distilling.§

* Report to Chamber of Deputies, p. 161.

† What this rate might have been will be indicated later in this article.

‡ *Cf. supra*, p. 454.

§ For a very readable and complete story of the activities of the commissioner and his subordinates in the suppression of these frauds, *cf. House Executive Document No. 62, Forty-sixth Congress, Second Session.*

TABLE III

REGISTERED STILLS SEIZED, 1877–1918*

1877	598	1898	2,391
1878	1,024	1899	2,190
1879	1,319	1900	1,955
1880	969	1901	1,499
1881	756	1902	1,282
1882	464	1903	1,323
1883	397	1904	964
1884	377	1905	1,053
1885	245	1906	1,376
1886	564	1907	1,139
1887	456	1908	1,130
1888	518	1909	1,743
1889	466	1910	1,911
1890	583	1911	2,471
1891	795	1912	2,466
1892	852	1913	2,375
1893	806	1914	2,677
1894	1,016	1915	3,832
1895	1,874	1916	3,286
1896	1,905	1917	2,232
1897	2,273	1918	†

There were three periods of special activity in illicit distilling followed by declines in illegal operations. Federal prohibition has brought the last period to an end without leaving much evidence on which a prophesy for the future could be made, although in the year 1917 there was a distinct falling off in the figures. The first period of prevalence of illicit operations followed hard upon the increase in the tax-rate in 1875. In Table III it is seen that the number of illicit distilleries seized rose from 598 in 1877 to 1,319 in 1879. Likewise, the greatest number of casualties came, as Table IV shows, in the early period from 1877 to 1881 when the Bureau first sent armed forces against the insurrectionary distillers. This increase in illicit operations can be traced to the change in the rate of the tax. No other explanation can be offered. The higher rate increased the price of spirits, with the result that the attention of distillers was directed to the profits of successful evasion of the tax which were sufficiently attractive to cause illicit distillers to be very numerous and very persistent.‡ Unfortunately there are no statistics to support it, but what evidence there is seems to show that after 1868 illicit distilling was no problem for the government until the tax was raised in 1872 and 1875.§ If, however, the increase in the taxrate caused such an increase in illicit distilling in the seventies, why should the business decline when the rate was still in force? For, by 1885, the number of illicit distilleries seized had fallen to 245, although there was a

* Figures taken from the *Annual Reports of the Commission of Internal Revenue.*

† Not given in the *Report* for 1918.

‡ *Finance Report for 1893*, p. 1108; *cf.* also Art. in *Sewanee Review* for November, 1893, by Elwood Wilson.

§ This is the position of Elwood Wilson in the *Sewanee Review*, p. 123; *cf.* also D. A. Wells, *Practical Economics*, p. 220.

TABLE IV

CASUALTIES IN THE SUPPRESSION OF ILLICIT DISTILLING, 1877–1917*

Year	Officers or employees killed	Officers or employees wounded	Total casualties
1877	12	8	20
1878	8	17	25
1879	7	19	26
1880	3	7	10
1881	1	9	10
1882	4	1	5
1883	1	0	1
1884	0	1	1
1885	1	0	1
1886	0	1	1
1887	0	1	1
1888	1	1	2
1889	2	2	4
1890	1	1	2
1891	1	3	4
1892	0	1	1
1893	3	0	3
1894	0	0	0
1895	1	2	3
1896	0	3	3
1897	1	3	4
1898	2	5	7
1899	1	3	4
1900	0	0	0
1901	2	4	6
1902	1	2	3
1903	0	0	0
1904	0	1	1
1905	1	0	1
1906	0	0	0
1907	0	0	0
1908	0	0	0
1909	1	0	1
1910	1	3	4
1911	1	2	2
1912	0	1	1
1913	0	2	2
1914	0	1	1
1915	3	0	3
1916	0	3	3
1917	0	3	3
Total	60	110	170

slight increase after that, and by 1894 there were no casualties whatever reported for the year. This decline in illicit distilling may be attributed to two causes: the vigorous opposition of the government to this practice and the greater general efficiency of the internal revenue machinery attained through experience.

In 1895 after the $1.10 tax had gone into effect there was the second increase in illicit distilling, and the seizures in that year amounted to more than a thousand and continued to increase until 1900, after which they began to decrease, falling in 1905 to 954, the lowest point reached since the early nineties. From 1902 to 1910 the total casualties also were very much reduced, three years of this period being characterized by an entire absence of any. Evidently the increase in the rate was the cause of the change in the amount of illicit distilling and for the

* Figures taken from the *Annual Reports of the Commissioner of Internal Revenue.*

same reason as under the last change of rate.* Thus, the statistics indicate† that, in the case of the $1.10 rate just as in that of the 90-cent tax, the spurt in illicit distilling was followed by a decrease in that activity when the distillers had been fully impressed with the serious purpose of the government to enforce the law and collect the tax.

Then there followed an unusual thing in the experience with the spirits tax. Without any change whatever in the rate of the tax, another increase in illicit distilling was observed. In 1906 the seizures began to grow until in 1916 they had reached the unprecedented number of 3,832, and during this period the casualties were more numerous. This third period of illicit activity was due to the spread of prohibition‡ which began in the Southern Commonwealths in 1907. Prohibition created the same condition as an increase in the tax in that it made the profits of fraud so attractive as to tempt large numbers into illicit distilling.§ Under state-wide prohibition the supply of whisky was greatly reduced, so that large prices could be secured for that which was produced. Furthermore, the state-wide prohibition was adopted in those states where illicit distilling had formerly been carried on,‖ which led to revival there. In recent years, the commissioners in their reports have referred to the difficulty of enforcing the law and collecting the tax in those areas where prohibition existed.¶ But prohibition and its effect upon the revenue are foreign to the subject of the present writing. They are mentioned here only in so far as they might have some bearing upon the fixing of the rate.

The conclusion seems to be clear, therefore, that although there was an increase in the amount of illicit distilling following each change in the rate, after a few years the activities of the illegal producers, by the force of the internal revenue service, were very much reduced. The increases in illicit distilling seem to have been due more to disturbance of the tax than to the particular rate which prevailed. When the rate was changed, the added profits of dishonest manufacture were suf-

* D. A. Wells felt that the frauds under the 90-cent rate were due to the rate, and advised at least against any raise in the tax. *Cf.* his letter to Secretary Carlisle in 1893, *Finance Report for 1893*, p. 1108. Elwood Wilson believed that the advance in the rate to 90 cents increased fraud and recommended a 50-cent tax instead of an advance beyond 90 cents. *Cf.* his article in *Sewanee Review* for November, 1893, p. 120. He attributes the sudden rise in illicit distilling after 1875 to the 90-cent rate. The Acting Commissioner of Internal Revenue, Mr. G. W. Wilson, also seemed, in 1897, to attribute the increase in illicit distilling after 1894 to the increase in the tax and he recommended that the rate be decreased from $1.10 to 90 cents, or even to 70 cents. *Cf.* his letter to the Secretary of the Treasury, April 3, 1897, *Senate Report, No. 411, Fifty-fifth Congress, Second Session*, pp. 555–556.

† These reductions in illicit distilling are also referred to from time to time in the Reports of the Commissioner of Internal Revenue.

‡ *Report of the Commissioner of Internal Revenue for 1910*, p. 77.

§ *Ibid.*, 1912, p. 25; *cf.* also Horace Kephart, *Our Southern Highlanders*, p. 189, where he refers to the profits made by boot-leggers in these districts.

‖ For statistics showing concentration of illicit distilling, see the various reports of the commissioner.

¶ *Cf.*, for instance, *Reports* for the years 1913, 1914, and 1915.

ficient inducement to bring into the field a large number of distillers, but when the power of the government was brought down on them the operations were curtailed and the number of casualties and seizures became more normal. The prevalence of the illicit operations depended also upon the methods and the efficiency of the administration of the law. More casualties and greater difficulty were met with under the 90-cent tax than under the $1.10 rate. There is no reason to believe that the $1.10 rate would not have been successful. So far as illicit distilling was concerned the statistics show that higher taxes do not in themselves permanently cause more violations of the law. Within certain limits it would seem that high taxes would result in no more difficulty than low, provided that the people became accustomed to them and that violations of the law were vigorously suppressed. It seems that with illicit traffic in spirits, it was more a question of law and efficiency of administration which developed slowly than with the particular rate of the tax. Moreover, it should be remembered in this connection that illicit production was largely confined to the remote mountain regions of the South, that the scale of operation was always limited, and that the total output of illegal stills, being inferior in quality and forming a comparatively small part of the country's product, could not offer very effective competition with tax-paid spirits.*

That the revenue was not permanently reduced by increases in tax rates is shown by Table V, which gives the receipts from the spirits tax. Only the data since 1868 are included because the period of the Civil War was too greatly characterized by changing policy and fraud. The figures for the years from 1872 to 1875 are affected by changes too close together to be instructive. But after 1875, when the rate was advanced to 90 cents, although the quantity of spirits withdrawn was temporarily reduced, the annual revenue obtained from the larger tax was increased. By 1880, however, the quantity of spirits withdrawn was as large as before the change in the tax, with a consequent rise in the revenue.† Again in 1893, after the tax was changed to $1.10, the number of gallons paying tax fell off for a few years, but by the close of the century the quantity paying tax had returned to normal, and the revenue before that had risen to its former level. Here again the increased tax, in a few years, brought in larger annual receipts than in the years before the change.

All this experience brings us to conclude that taxes even higher than

* F. C. Howe, *Taxation and Taxes in the United States*, p. 230, where he comments upon the unimportance of the illicit product in the total output of the country.

† *Cf.* the *Reports of the Commissioner of Internal Revenue* for various years for the number of gallons withdrawn.

the $1.10 rate might have been successfully collected from spirits. No great permanent decrease in consumption or increase in illicit distilling would have been expected from the higher rate. Undoubtedly, illicit distillers would have been temporarily active under an increased rate and the consumers would have for a time at least reduced their use of

TABLE V

FEDERAL RECEIPTS FROM SPIRITS IN THE UNITED STATES, 1869–1918*
(IN MILLIONS OF DOLLARS)

Year	Receipts	Year	Receipts
1869	33.7	1894	79.9
1870	39.2	1895	74.8
1871	31.1	1896	75.3
1872	33.1	1897	77.0
1873	43.1	1898	87.7
1874	43.8	1899	93.6
1875	46.9	1900	104.4
1876	51.4	1901	110.9
1877	52.7	1902	115.3
1878	45.6	1903	125.9
1879	47.7	1904	129.6
1880	55.9	1905	129.5
1881	62.2	9106	137.0
1882	64.8	1907	149.7
1883	69.0	1908	133.6
1884	71.7	1909	128.3
1885	62.2	1910	141.5
1886	63.8	1911	148.1
1887	60.6	1912	149.4
1888	64.4	1913	157.5
1889	69.4	1914	153.0
1890	76.5	1915	136.6
1891	79.6	1916	149.8
1892	85.5	1918	181.1
1893	89.2	1917	303.

spirits, but the past leads us to think that these results would have been only ephemeral and that in a few years the receipts into the treasury would have indicated the restoration of normal conditions in consumption and illicit operations. Serious frauds and illicit practices were slowly suppressed as the years passed, and with vigorous law enforcement and the changed conditions America, like England, was capable in late years of collecting heavier taxes on spirits. It is of course difficult to say exactly how high the tax might have been made. There is undoubtedly a maximum revenue rate above which advances in the tax would not bring proportionate increases in revenue. Temporary and permanent prohibition have prevented us from seeing the results which would have followed from the $2.20 and the $6.40 taxes imposed in 1917 and 1919,† respectively. In view of the facts, the writer believes it reasonable to think that during the last twenty-five years at any rate, a tax of at least $2 might have been wisely imposed

* From the *Reports of the Commissioner of Internal Revenue.*

† Acts of October 3, 1917, and February 24, 1919, cited above.

on strong drink.* Whatever the rate should have been, one thing seems clear and that is that for some time before the recent war emergency the federal government did not fully utilize spirits as a source of revenue.†

* In this connection *cf.* article by Professor Charles J. Bullock in the *Quarterly Journal of Economics* for May, 1917, p. 368, in which he expressed the belief concerning war finance that the tax "on spirits could probably be raised to $1.50 per proof gallon without making it difficult to enforce, and if the Bureau of Internal Revenue so advises, should be increased to $2.00 per gallon."

† It should be mentioned in this connection that in the eighteen-eighties an attempt was made entirely to abolish the revenue from spirits and all internal revenue. *Cf. Debates* in the Congressional Record for 1888, and the platform of the Republican party in that year. *Cf.* also an article by Judge Kelley in the *International Review* for October, 1882, p. 305.

SECOND REPORT OF THE ADVISORY COMMITTEE ON THE CENSUS

A REPORT OF PROGRESS BY THE JOINT COMMITTEE OF THE AMERICAN STATISTICAL ASSOCIATION AND THE AMERICAN ECONOMIC ASSOCIATION TO ADVISE THE DIRECTOR OF THE CENSUS

To the American Economic Association and the American Statistical Association:

The second report of progress of your Joint Advisory Committee to the Director of the Census is respectfully submitted herewith.

ORIGIN OF THE COMMITTEE

At the request of the Secretary of Commerce each of these Associations at the annual meeting held at Richmond in December, 1918, designated three members to represent it upon a joint committee to advise with the Director of the Census concerning the taking, tabulating, and publishing of the Fourteenth Census of the United States. This Joint Committee of six organized for work in February, 1919, and each member was subsequently appointed a special agent of the Census Bureau at the compensation of $1.00 a year. To the annual meeting of each of the two Associations held at Chicago in December, 1919, the first report of progress was submitted. It was later printed in pamphlet form and also in the Quarterly Journal of the AMERICAN STATISTICAL ASSOCIATION, (Vol. XVII, pages 76–106) and the *American Economic Review*, (Vol. X, supplement pages 267–278).

ACTIVITIES DURING THE YEAR

The present report covers the activities of the Committee from the date of the last report to December 1, 1920. During that period five meetings of the Joint Committee have been held at Washington:

January	23–24, 1920,
April	23–24, 1920,
May	28–29, 1920,
October	8– 9, 1920,
November	19–20, 1920.

The departure last autumn of Professor E. R. A. Seligman, a representative of the American Economic Association, to California to exchange with Professor Carl C. Plehn of the University of California, left a temporary vacancy, and the remaining members of the Committee informally invited Professor Plehn to sit with them on the Committee. This invitation Professor Plehn accepted, and he at-

tended the meetings held on April 23 and 24 and on May 28 and 29. Professor Seligman resumed his place on the Committee at the October meeting.

Twenty-five recommendations in all were adopted at the five meetings of the Committee held during the past year (see Appendix I). Eleven of these related to the presentation of the statistics of population, four to that of the statistics of agriculture, two to that of statistics of manufactures, and eight to general matters of census policy.

The recommendations made by the Committee during 1919 numbered thirty-nine and thus were more numerous than those made during 1920.

This reduction in the number of recommendations does not mean that during its second year the activities of the Committee lessened. On the contrary the Committee believes that its work has increased in value as its members have become more familiar with Census work and have come into closer contact with the Census staff. But it has found its main opportunities for service in the application of the principles set forth in its recommendations to the many current problems of census procedure.

The recommendations made in 1919 dealt with a great variety of subjects pertaining to preliminary organization. During 1920 the sessions of the Committee have been held with the enumeration of the Fourteenth Census either well under way or an accomplished fact. Hence definite problems of statistical policy, form of presentation of tables, and extent and character of text, all matters of extreme importance to the Bureau and many of them subject to long-standing differences of opinion within the office, were referred to the Committee. Full consideration was given each problem presented, and recommendations embodying the Committee's recommendations were made. In nearly every instance these recommendations were accepted by the Bureau. Thus within the past year the census officials have made larger use of the Committee as a court of appeal on disputed points.

POLICIES ADVOCATED

From the beginning of its work the Joint Advisory Committee has had two guiding policies: (1) To aid the Bureau of the Census to expedite the publication of the basic tables relating to population, agriculture, and manufactures, and (2) To aid the Bureau to secure an adequate scientific analysis of the data.

In pursuance of the first aim the Committee has recommended such simplification of the main census reports as will reduce the time required to prepare them for the printer without reducing the scope or

accuracy of the fundamental tables. For example, it has accompanied its recommendation that appropriate cartograms be used in bulletins with the proviso that their preparation does not postpone publication more than ten days. Again, believing that the number of percentages and averages included in the final volumes of the Thirteenth Census was so great as to cause delay in the completion of the manuscripts, the Committee has recommended that figures of this description be greatly reduced in the volumes of the Fourteenth Census. Finally, the Committee has twice this year called attention to one of last year's resolutions. ". . . that no text be printed in the bulletins and final reports that is not needed to clarify tables, or to prevent misconstruction of figures, and that all interpretation be reserved for special studies."

This policy has met with the cordial approval of the Director. As a result of its adoption we believe that the members of the two Associations which the Committee represents and the public at large will receive the chief results of the Fourteenth Census months earlier than would have been possible had these volumes been modelled more closely on those of the Thirteenth Census.

This greater promptness of publication the Committee believes to be a decided gain. But great as this gain is, it would be purchased at too high a price if the Bureau of the Census should provide no more adequate analysis of its results than will appear in the main volumes. The Committee lays even more stress upon improving the scientific analysis of the data collected than upon prompt publication.

If these two aims of Census policy—prompt publication and thorough analysis—seem in conflict with each other it is because of defective organization of the census work in the past. Thoughtful analysis is exceedingly difficult to secure while the office feels the pressure for publication of the main reports. Moreover, for thorough analysis of one branch of census statistics careful comparison with other branches is usually necessary. Of course such comparative work is not feasible when each volume is being prepared separately for the printer and every one is working against time. In fact the doubtful value of much of the text in previous censuses is evidence that we cannot expect good analysis to be included in volumes which the law requires to be issued within the census period. It is better to separate the task of printing the tables from that of analyzing the figures; to issue the tables promptly and when they have been printed to submit the more significant to scientific analysis. That is the policy for which the Committee stands.

For this thorough supplemental analysis the Committee has sub-

mitted to the Director of the Census a partial list of topics requiring particular attention; and has recommended that for the preparation of these analyses he secure the services of investigators of recognized standing. The Committee is glad to report that the Director has recognized the desirability of this policy and accepted it in principle. But he has not concealed from the Committee his apprehension lest, after the main volumes have been published, it may prove difficult to secure funds for this scientific work.

Under these circumstances the Committee suggests to the two Associations that they express to the Director of the Census their interest in securing a scientific analysis of census results, their support of his policy of employing scientific men for this work, and their willingness to aid him in carrying out this policy.

This matter is of pressing importance in deciding the character and value of the Fourteenth Census. In addition, it has an importance that is not transient. If a supplemental scientific analysis of the results is made the Committee believes that its value will be so clear and its interest so great that scientific study of the results will become a permanent feature of American censuses. Then the two policies for which the Joint Committee has worked—prompt publication and thorough analysis—will appear in their true light; not as rivals but as supplements.

IMPROVING THE FORM OF THE VOLUMES

In considering the subject of the printed presentation of census results the Committee was convinced that an opportunity existed to effect an important reform. It has kept constantly in mind the inconvenience which workers in statistics encounter whenever they consult census publications. The assumption heretofore has been that the quarto page is necessary for the purpose of effectively presenting census tables. This, however, has been disputed by some experts in census table construction and successful experiments already have been made with octavo volumes. The Committee earnestly favors the latter form but after mature consideration it was not convinced that the experiment had proceeded far enough to insure certainty of success in the varied requirements of all the final reports of a decennial census. This being the case, it perceived the gravity of embarking upon a radical change, not fully matured, which, if not successful, would mean confusion, delay, and great expense. Accordingly it adopted the policy of approving the retention of the quarto form for the volumes of the present census and urging a systematic test of the octavo form in all intercensal reports.

The Committee believed, however, that one serious defect in the quarto form could be remedied. To print census volumes upon paper of the weight and thickness of Government contract wood pulp stock seemed unnecessary, and the Committee recommended the use of paper not exceeding 30 pounds per ream standard size. (See Recommendations 31d and 64.) This simple reform would bring relief to all users of census reports, since a quarto volume of 1,000 pages would not much exceed one inch in thickness and would weigh not over four pounds.

REQUIREMENT FOR ADDITIONAL CENSUS FUNDS

It is appropriate to say that, though the officials of the census necessarily labored under great difficulties in making their estimates as to the cost of the Fourteenth Census, they have been able to keep expenditures within the limits of their estimates. Congress, however, in making appropriations for the work thus far has not granted the full amount requested. The total amount asked for (December, 1919) by the Director was $23,765,000; three appropriations have been made, totaling $22,500,000. If Congress will appropriate the remaining $1,215,000, the Bureau continues confident that this amount will suffice to complete the tabulation and publication of the results of the Fourteenth census. On the other hand, if no additional appropriation is made, at the present rate of expenditure, one-third of the decennial census period, namely, a fiscal year, is unprovided for. The possible lack of adequate funds is a factor that must be considered in the plans now pending for the completion and publication of the Fourteenth Census within the legal period.

PROGRESS OF THE FOURTEENTH CENSUS

In conclusion the Committee desires to set forth in considerable detail for the information of the two Associations which it represents, and also for reference in future census work the time schedules and accomplishments of the principal divisions of the Bureau in taking the Fourteenth Census.

For administrative purposes the work of the census falls into five stages. (1) Preliminary work, consisting of the preparation of the schedules and instructions, and appointment and training of the field force. (2) The field work. (3) The receipt of the returns and their preparation for tabulation. (4) The tabulation. (5) The preparation of the final tables and reports.

The work of the first three stages is now virtually finished, at least for population and agriculture; and the fourth finished so far as con-

cerns the distribution of the population of the United States according to states, counties, and minor civil divisions. The field work on the census of manufactures continues through a longer period, and thus the stages of work in this division do not synchronize with those in the Divisions of Population and Agriculture.

A limited time—3 years—being allowed by the law for the completion and publication of the census, it is necessary to decide in advance upon the dates on which certain stages of the work shall be finished. For example, the supervisors should all be appointed months in advance of the date on which the enumeration is to start. The schedules and instructions should all be printed and ready to deliver to the supervisors at the time of their appointment. A time schedule should be drawn up for the beginning of the enumeration; its completion; receiving the schedules at the office; beginning and finishing of editing; beginning and finishing of card punching, sorting, and tabulating; preparing manuscript; and printing.

In compliance with the request of the Committee, the Director furnished statements fixing, so far as possible, the dates on which these various processes should be finished. The Committee is glad to be able to report that the work in the two large divisions of population and agriculture, though somewhat delayed in the early stages, has now been brought up approximately to schedule.

Population

The Population Division is responsible for the instruction of the supervisors and enumerators, also for the shipment of all blanks required for their work; the receipt of the completed returns and their distribution to other divisions of the Bureau.

During July, August, and September, 1919, the Population Division was to prepare and have printed the schedules and instructions to supervisors and enumerators for enumeration of the population, prepare and have printed the special schedules and instructions for the outlying territories of Alaska, Hawaii, Guam, Samoa, Porto Rico, and the Panama Canal Zone, and the military and naval forces stationed abroad, and was to begin the shipment to the supervisors of the supplies required for their office and field work. The division accomplished all of this preliminary work that it was contemplated would be done during the three months, so far as the appointment of the supervisors permitted. By the end of September 357 supervisors out of a total of 372 had been appointed.

The work of the Geographer's Division is closely associated with this initial stage of the work of the Population Division. The Geog-

rapher is primarily responsible for the establishment of the boundaries of enumeration districts. A statement of the boundaries in his district is sent to each supervisor for criticism and correction. It was expected that all enumeration districts would be established before September 1, but it was found impossible to accomplish this, and by the end of September the boundaries of enumeration districts for only 351 of the supervisors' districts, or not quite 95 per cent, had been established.

During October, November, and December, 1919, the rest of the supervisors were to be appointed, the boundaries of enumeration districts completed and the enumerators selected and instructed so that they would be in a position to begin work promptly on January 2, 1920, the division to have charge of the correspondence with the supervisors and enumerators was to be organized and a large amount of other miscellaneous work incident to the organization of the field force was to be done.

During these months the schedule also called for the accomplishment of the following work: determining the form of the punch card to be used for the census of population, making final arrangements in regard to the installation of 843 punches, 23 sorting machines, and 30 tabulating machines.

All of the work outlined for the office force was accomplished. By January 1 all the supervisors had been appointed; but owing to the abnormal industrial and social conditions following the war the supervisors found great difficulty in securing qualified persons to act as enumerators, and in a large number of districts the work of enumeration was not started on January 2.

The work called for by the schedule in the first half of 1920 was as follows: To complete the enumeration of the population; to organize the large force of clerks required to make the preliminary hand count of population, and to edit the schedules; to organize the force of operatives for punching the cards; to approve and turn over to the Disbursing Clerk the enumerators' vouchers; to begin the publication of preliminary totals for the population in cities and minor civil divisions; to establish the form of the state bulletin presenting the statistics of population by counties, cities, and minor civil divisions.

The delay in the appointment of the enumerators, principally due to a country-wide scarcity of labor, affected not only the field work but also that of the Bureau at Washington. The severe weather conditions which prevailed throughout the United States during January, February, and even March, also greatly retarded the work of the enumerators. The law contemplates that the enumeration shall be

completed in one month. In the majority of the enumerators' districts it was necessary to extend this period, and in a few the work was not completed before July 1; in fact there were three or four districts in which the work was not finished until even later in the year. The first schedules from the enumerators were received on January 15 and the examination and preliminary count were started promptly on January 17. Announcements of population were made for the District of Columbia and Cincinnati, Ohio, on February 21. Editing of the schedules started about February 1, and the punching of the cards on March 1. During the latter part of this period, preliminary announcements for cities, counties, and states, were made daily. Although hampered by failure to receive complete returns from the field, the Population Division had accomplished by July 1 all that reasonably could be expected. During this period the Committee had several conferences with the officials of the Bureau in regard to the form of the bulletins and reports for population, but the final form of the state bulletins could not be determined until the October meeting.

During the last half of 1920, the schedule provided that the Population Division should reach its maximum size; that the editing of the schedules and the punching of the population cards should be finished; that the verification of the cards by the tabulating machines should be completed; that the total population of the United States should be announced; that a start should be made in the publication of bulletins giving the population by minor civil divisions; that preparations should be made for the first and second runs of the population cards and this work started; that the form of the tables for the bulletins giving the composition and characteristics of the population should be fixed. It was also planned to begin in this period the publication of preliminary figures giving the analysis of the population by color or race. The schedule further provided for organizing during this period the force required to edit the schedules for the census of occupations; establishing the form of the card to be used; and starting the work of punching these cards.

Much of this work has been completed and it seems probable that the remainder will be accomplished by the end of the period, but in justice to the Bureau the Committee desires to call attention to the unusual difficulties attending the organization of the force of clerks and operatives. There seemed to be a scarcity of persons qualified and willing to do the work. Special arrangements were made with the Civil Service Commission to hold examinations in the Bureau at Washington, and appointments were made without delay.

The Bureau's records show that to operate the punching machines

day and night in the Population Division required about 1,600 people. To operate the machines in the Division of Agriculture required about 1,100 people. To appoint this force of 2,700 operators the Bureau communicated with 9,333 persons eligible for appointment. Of this number 391 declined to consider the appointment, 1,730 neglected to answer the inquiry, and 2,190 were rejected for various reasons. A total of 5,022 appointments were made during the period from March 1 to September 1, 1920.

This indicates an excessive turnover in the force, which added materially to the difficulties and expense of the work. Clerks and operatives would report for duty, work a few days, and resign. This was due in part to the prevailing shortage of labor, but especially to the low wages paid by the Bureau for this class of work as compared with wages then obtainable in the industrial world. When the Committee met on May 28, this situation had become so acute that to assist the Director to meet it, the following recommendation was adopted:

"The Committee regrets to learn of the continued difficulty in securing adequate output from the pantagraph punches. Since the whole success of the Census, from the standpoint of prompt accomplishment of its work, rests primarily upon speeding up this initial process, the Committee strongly recommends that a new system of employment and payment be established for the night shift and, if advisable, also for the day shift. Under this new plan such increased compensation should be offered, up to 60 cents a hundred, as will attract competent and steady workers. These temporary workers should be employed outside the Civil Service classification and without any of the privileges (sick leave, etc.) customary for the permanent employees of the Government.

It is the belief of the Committee that a careful comparison of the cost of the present service, unsatisfactory because of its large labor turnover and small output, with an efficient service at largely increased pay, would show under present conditions the real economy of higher wages.

In any case, it is absolutely essential that the present situation be corrected by prompt and vigorous action. Freedom from Civil Service regulations and an attractive piece-rate are fundamental. The Committee desires to record formally its recommendation that these steps be taken at once."

The Bureau adopted the policy of increasing its piece-work rate of pay for punching the cards. This change worked fairly satisfactorily. It is doubtful if the Director of any earlier census ever encountered more serious labor problems than those encountered by the present Director.

The preliminary count of the population of the United States was announced on October 7, which was relatively twelve days later than the date of the corresponding announcement at the last census. While comparisons in such matters are difficult to make in definite terms,

officials connected with both censuses insist that more satisfactory progress has been made at the Fourteenth than at the Thirteenth Census, because during this period other branches of the work were carried to a more advanced stage.

Most of the errors in the census are due to defects of enumeration, such as the omission of individuals or incorrect replies. The term of employment of the supervisors and enumerators is too short for them to understand the work thoroughly and to appreciate the importance of a strict compliance with the regulations prepared for the purpose of assuring the enumeration of every individual. In some cases the enumerators will neglect, through oversight or carelessness, to enumerate certain portions of their districts; in others, persons residing within corporate limits will be enumerated outside the limits, or those outside will be enumerated within the limits. In some cases supervisors neglect to appoint enumerators for certain districts. In others they do not give the close supervision necessary to ensure thorough enumeration.

To reduce these errors to a minimum, the Bureau, at the Fourteenth Census, early solicited the coöperation of chambers of commerce, boards of trade, and public-spirited citizens throughout the entire country. These organizations and persons were requested to coöperate with the supervisors and enumerators, and, if they believed that a careless enumeration was being made, to call the facts to the attention of the supervisor, or to communicate directly with the Bureau at Washington. As a further precaution against errors of omission, arrangements were made to publish the preliminary totals for all cities, counties, and minor civil divisions just as quickly as the data could be assembled and to send copies of these preliminary statements to chambers of commerce, boards of trade, and other persons for the purpose of verification. This practice has resulted in the correction of many errors such as, it is believed, crept into prior censuses and were never detected.

While the vast majority of the complaints of defective enumeration proved upon examination to have slight foundation, there were a number of instances in which the Bureau after checking the work of the enumerators added considerable numbers to the population of cities and townships. This was the case in Richmond, Va., Birmingham, Ala., Gainesville, Fla., Kansas City, Mo., and Pueblo, Colo. In some cases the mayors of the cities and representatives of the civic organizations made an independent canvass of their cities, listing the names of all residents. These lists were brought to Washington by the city representatives and compared with the returns of the enumerators. The persons found on the new lists but not on the original schedules

were subsequently visited by sworn enumerators and, if eligible for enumeration, included in the population of the cities.

By this policy the Bureau not only reduced the margin of error in its statistics of population but also secured the coöperation of local authorities in safeguarding its work—contacts that should prove helpful to the Bureau at subsequent enumerations. The Joint Committee regards this policy as a marked improvement, which should become a permanent feature of census taking.

Agriculture

In the Division of Agriculture it was planned that during the last six months of 1919, the schedules, forms, and instructions should be established and printed; publicity work should be conducted to familiarize the farmers with the scope, purpose, and value of the statistics of agriculture; lists of irrigation and drainage enterprises required for the field force should be prepared; arrangements should be made for the purchase or lease of all mechanical equipment for punching and tabulating the cards; the schedule and card files should be constructed and systems of filing worked out; forms of tables should be established and figures for the census of 1910 entered; and the general plan and scope of the bulletins and reports should be established. Except for the detailed plan of the bulletins and reports all of this work was finished within the period named.

The work planned for the first half of 1920 was to complete the enumeration, make a preliminary examination of the schedules as they were received from the enumerators; carry on correspondence looking toward their completion and toward the further instruction of supervisors and enumerators who were doing inefficient work; complete the instructions for clerks who were to edit the schedules; organize a force of approximately 400 clerks required for editing; complete the instructions for punching the cards and organize a force of approximately 1,100 clerks for this work; install 70 sorting machines and 61 tabulating machines; establish the forms of result slips upon which the data from the tabulating machines are entered; begin the publication of preliminary totals for counties; publish a bulletin showing the number of farms by states and counties; and arrange for the publication of preliminary press announcements of the totals for counties.

The Division of Agriculture was able to maintain its schedule with but one exception. Since the farm schedules were secured by the enumerators for population the delay in the appointment of the enumerators retarded the completion of the enumeration of farms. This delay made it impossible to publish the bulletin on the number of farms until October 7, 1920.

At the Thirteenth Census two bulletins on agriculture were issued for each state, of which the first apparently was printed to meet the urgent demand for prompt publication of results and contained data on practically all the subjects covered by the schedule. The second bulletin contained additional details concerning the same subjects and text consisting largely of a repetition of the figures in the tables. For the Fourteenth Census, in accordance with the general policy agreed upon by the Bureau, it was decided to publish but one bulletin for each state and to confine the text to essential explanatory matter. This arrangement has not only eliminated duplication, but has also made possible a more logical and compact presentation of the data. A considerable saving in expense has been effected and at the same time an earlier date secured for the publication of the final report.

The schedule for the last half of 1920 was as follows: To complete the editing and preparation of the schedules for the card punching; bring the number of operatives up to the required maximum; keep all of the sorting and tabulating machines in operation during the entire period; begin the publication of state bulletins on agriculture; issue the first of the series of preliminary announcements of statistics of agriculture by states and preliminary statistics of irrigation and drainage.

The first preliminary statement was issued on June 1, 1920, for Cheatham County, Tennessee. The first bulletin was issued on September 22, for New Hampshire. Up to November 1, the Bureau had published 228 county press summaries for agriculture, 139 for drainage, and 157 for irrigation, and sent to the printer copy for four state bulletins. The preliminary examination of schedules was completed on July 21, and the editing of schedules on August 4. The punching of cards for the census of agriculture, originally scheduled to be completed by June 30, 1921, will be completed in December, 1920. The work of this division appears to be well advanced.

During the first half of 1921 it is planned to complete the tabulation of the cards for the census of agriculture, publish the bulletins for most of the states, and make substantial progress in the preparation of the tables for the final report.

Manufactures

The field work of the census of manufactures differs from that of population and agriculture in that returns are secured by mail so far as possible. Where this is not possible, special agents secure the schedules by visiting the plants.

At the beginning of the census period a large proportion of the experienced employees of the Census Bureau were in the Division of

Manufactures. It was necessary that these trained employees should be utilized to instruct supervisors and to act as supervisors in districts where vacancies occurred. This necessarily postponed the date on which the field force of the Division of Manufactures could be completely organized, and retarded the completion of the enumeration.

The Division of Manufactures planned to complete during the last half of 1919 the list of the names and addresses of the manufacturing establishments and of the central offices from which a number of separate plants are managed; prepare all schedules and instructions; divide the United States into convenient districts for the field force; prepare the schedules to be mailed to the manufacturing establishments; select the special agents for the field work; and begin the organization of the field force.

The program for the first half of 1920 was as follows: Mail schedules; organize the field force and the clerical force; make preliminary examination of the schedules received; organize the editing force; decide upon the methods of tabulation; close the enumeration in certain districts; and, if possible, begin issuing preliminary statistics for cities.

The Committee learned at the meeting in November that the field work of the Division of Manufactures had been greatly delayed by the difficulty of securing and retaining the services of competent field agents. This was due to the low salary permitted under the law, $125 per month being the maximum. Fourteen hundred agents were needed, but by July 1, in spite of every effort on the part of the Division, only 1,000 were at work. In some places, notably in Detroit, the appearance of a business-like representative of the Bureau in the office of a corporation needing clerical assistance led to attractive offers of immediate employment. These offers were often accepted on the spot and it is difficult to exaggerate the embarrassment of the field supervisors deprived of valuable special agents and unable to fill their places. By reason of this rapid turnover it was decided not to incur further expense and delay by continued effort to secure and train additional men, and the Division proceeded to carry through the field work with the limited force at its disposal on July 1.

The plan for the last half of 1920 contemplated completing the enumeration; editing all the schedules; organizing the force for this work. By the close of November the field work of collecting the reports was practically finished, but the last of the outstanding schedules will not come in before the end of the year. The method of tabulation has been decided upon, and the punched card system will be used for the first time in this branch of census work. All of the blanks required for the work have been prepared. A start has been made in issuing

preliminary summaries of results. Such statements have been published for the District of Columbia and Hawaii.

At the present time the Committee is advising with the Bureau as to the form of tables and the character of text to be included in the bulletins and final reports of the Division of Manufactures.

FOR THE AMERICAN STATISTICAL ASSOCIATION:
WILLIAM S. ROSSITER, Chairman,
CARROLL W. DOTEN,
EDWIN F. GAY.

FOR THE AMERICAN ECONOMIC ASSOCIATION:
WALTER F. WILLCOX,
WESLEY C. MITCHELL,
EDWIN R. A. SELIGMAN.

December 1, 1920.

APPENDIX

RECOMMENDATIONS MADE TO THE DIRECTOR OF THE CENSUS BY THE JOINT COMMITTEE OF THE AMERICAN ECONOMIC AND THE AMERICAN STATISTICAL ASSOCIATIONS TO ADVISE THE DIRECTOR OF THE CENSUS.

40. Incorporated places which are primary civil divisions, with the population figures, will be retained in the minor civil division table, but other incorporated places will be included in that table only by name (*e.g.* Prattsville, including Prattsville town).

41. The Committee recommends that population by wards be omitted from the minor civil division table and that a separate table be included to show population by wards for 1920 only for cities of 5,000 inhabitants or over, this table to be constructed four columns to the page.

42. The Committee approves the inclusion of two new county tables in the first series of population bulletins which shall embody data that in 1910 were shown in the first part of the county table of the second series. The first of these new tables will show the population from 1850 to 1920, the per cent of increase for the last three decades, and the land area and population per square mile for 1920. The other table, which will be the last table of this bulletin, will show the urban and rural population in 1920, 1910, and 1900, the per cent urban in these three years, the per cent of increase in urban and rural population, respectively, in the last two decades, and the rural population per square mile in 1920. In this last table only those counties each of which contains one or more incorporated places of at least 2,500 inhabitants in 1920 will be shown separately, the totals for all the other counties in a given state, i. e., the rural counties, being given on a single line at the end with a note showing the names of those counties.

43. The Committee recommends that the presentation of data for counties and for principal cities in the state supplement bulletins for population be reduced to a one-page stub, and that the information thus omitted from the state bulletins appear so far as practicable in the report on population by subjects, together with certain of the data already contained in the state supplement bulletins.

44. The Committee discussed with the Chief Statistician for Agriculture his general plan for the tabulation of data secured from the Fourteenth Census farm schedule. The Committee approves the outline and series of tables proposed, but anticipates that minor departures from it may become necessary as the work progresses.

45. The Committee approves of the plan of the Division of Agriculture to publish statistics of number of farms, by counties, for the present census and for the two preceding censuses at the earliest possible date after the completion of the enumeration.

46. The Committee believes that the number of percentages and averages included in the final volumes of the Thirteenth Census was so great as to delay their

publication and accordingly recommends that the figures of this description in the volumes of the Fourteenth Census be greatly reduced.

47. The Committee recommends—
    a. That all text tables shall be numbered and bear titles.
    b. That Roman numerals be used for numbering text tables and Arabic numerals be used for numbering general tables.

48. The Committee recommends that its Resolution No. 31g as follows: "To the end that all possible saving of time may be effected, it is recommended that practically all so-called interpretative text be omitted from the bulletins and reports of the Fourteenth Census and that no text be printed in the bulletins and final reports that is not needed to clarify tables or to prevent misconstruction of figures, and that all interpretation be reserved for special studies," shall apply to the preparation of all text in the state bulletins and final reports relating to population, agriculture, and manufactures.

49. The Committee recommends that cartograms such as were used in the Thirteenth Census be included in bulletins of the Fourteenth Census, where appropriate, providing that the preparation of such cartograms does not delay the publication of a bulletin more than ten days.

50. The Committee recommends that, in determining the boundaries to be used in reporting the population of any municipality, the Bureau of the Census should follow the limits of that municipality as determined by law, and that, in cases where the census of 1910 did not follow this rule, its figures be amended so as to become comparable with those for 1920, the change to be explained in a footnote.

51. The Committee approves the following plan, submitted by the Chief Statistician for Population, for classifying foreign white stock:
    a. That the foreign born be classified:
        (1) By mother tongue and country of their own birth, on the basis of the post-war map.
        (2) By mother tongue and country of birth of their parents on the basis of the pre-war map.
    b. That the native born of foreign parentage be classified by mother tongue and country of birth of their parents on the basis of the pre-war map.

52. The Committee approves the outline submitted by the Chief Statistician for Population, indicating the plan to be followed in preparing the material for the occupations report, and recommends—
    a. That the Chief Statistician for Population proceed as rapidly as possible to edit the schedules and punch the cards required for the census of occupations.
    b. That the Director adopt the policy of publishing the occupations report within the decennial census period and that, if necessary, certain other topics, to be decided upon later, be sacrificed in order to include occupations, the working out of this policy to be determined by the Director in conference with the Advisory Committee at a subsequent meeting.

53. The Committee approves a plan submitted by the Chief Statistician for Manufactures of reporting data by industrial zones, provided that where so-called

metropolitan districts are recognized by the Division of Population, these metropolitan districts and the corresponding industrial zones shall be coterminous.

54. The Committee recommends that the Abstract be published in one octavo volume, not to exceed 1000 pages, and that it contain only the more important figures with reference to each of the three general subjects of investigation. The Abstract is not to be a substitute for the general volume on each subject. Further details as to data to be included will be considered at a future meeting.

55. The Committee, having conferred at length with the Chief Statistician for Population and his expert assistant and with the Chief Statistician for Revision and Results concerning the table form and content of the second series of population bulletins, has approved certain forms submitted for summary tables and advised the incorporation of certain desired items from the proposed forms of both experts. These combined data have been fully considered and approved by the officials and their adoption is recommended by the Committee. It is understood that complete forms as indicated will be at once drawn off by the Bureau and submitted for final approval to the Committee. The forms tentatively approved include a one-page stub for the county table and for cities of 10,000 inhabitants or more, a half-page stub for incorporated places of 2,500 to 10,000 inhabitants, and a one-page stub differing from that used for the counties for the wards of cities of 50,000 inhabitants or more.

56. The Committee regrets to learn of the continued difficulty in securing adequate output from the pantagraph punches. Since the whole success of the Census, from the standpoint of prompt accomplishment of its work, rests primarily upon speeding up this initial process, the Committee strongly recommends that a new system of employment and payment be established for the night shift and, if advisable, also for the day shift. Under this new plan such increased compensation should be offered, up to 60 cents a hundred, as will attract competent and steady workers. These temporary workers should be employed outside the Civil Service classification and without any of the privileges (sick leave, etc.) customary for the permanent employees of the Government.

It is the belief of the Committee that a careful comparison of the cost of the present service, unsatisfactory because of its large labor turnover and small output, with an efficient service at largely increased pay, would show under present conditions the real economy of the higher wages.

In any case, it is absolutely essential that the present situation be corrected by prompt and vigorous action. Freedom from Civil Service regulations and an attractive piece-rate are fundamental. The Committee desires to record formally its recommendation that these steps be taken at once.

57. While the Committee approves in the main the bulletin on agriculture for New Hampshire, it suggests that the text, after being curtailed in the manner indicated in the revised form submitted at this meeting, be printed in type smaller than ordinary text type under the title "explanations," such explanations to remain next to the individual tables; and in this connection the Committee calls attention to its general recommendation made in Recommendations Nos. 31g and 48, namely, that all so-called interpretative text be omitted from bulletins and reports of the Fourteenth Census.

58. The Advisory Committee approves the form and content of the first series of

state bulletins of population as exemplified by the bulletin for Maryland submitted in proof.

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59. The Committee, having examined the basic tables of Chapters I, II, III, V, and XV, of the General Report on Population for 1910, reached the following conclusions regarding the corresponding sections of the Report for 1920:

a. In Chapter I (Number and distribution of inhabitants) the Committee recommends that Table 64, relating to counties, be retained, but that a table showing incorporated places be substituted for Table 59.

b. In Chapter II (Color or race, nativity, and parentage) the Committee approves the arrangement of Table 21.

The omission of Table 48 (Indian, Chinese, and Japanese population in cities of 25,000 inhabitants or more) is recommended.

The Assistant Director's suggestion that the detail of Table 46 be reduced to conform to the detail of Table 47 and that the two tables be combined in one table arranged alphabetically by states is approved.

The Committee approves Table 40 in its form in the 1910 volume.

Table 42, with such changes as are necessitated by the separation of foreign and mixed parentage, is approved.

c. The Committee recommends that in Table 21 of Chapter III (Sex) the absolute numbers and the ratios be given for 1920, but that for 1910 and 1900 the ratios only be shown, and the table be presented in half measure. The separation of foreign and mixed parentage is also to be made in this chapter. It is recommended that Tables 26, 27, and 28 be combined in one table, to conform to the revised form of Table 21.

d. With regard to Chapter V (Marital condition) the Committee approves the presentation of marital condition figures for persons 15 to 34 years of age by single years of age.

e. The Committee approves in general the form of the tables in Chapter XV (Dwellings and families).

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60. The Committee has considered the statement of the Chief Statistician for Manufactures concerning the progress of his work and the proposed form of the bulletins on manufactures by states. It is gratified to learn that the form of presentation can be readily made to agree with the style recommended by the Committee and adopted by the Bureau for the bulletins on agriculture and population. The Committee invites attention to the original recommendation on this subject (No. 48), which included the publications of manufactures as well as those of population and agriculture. It is understood that the Chief Statistician for Manufactures will submit to the Committee at its next meeting outlines of tables which he plans to utilize in the state bulletins about to be prepared by his division.

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61. The tables on "Marital Condition" in 1910 (Census Vol. I: pp. 507–687) describe a situation not very different from that in 1890 and 1900.

Since the marital condition ratios do not change from census to census as greatly as the ratios in occupations and since the occupation tables in 1910 were greatly curtailed, the Committee recommends that if serious abridgement in the tabulation of one field or the other is necessary it should be made in the tabulation of marital condition.

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62. The Joint Committee approves the form and content of the bulletin "Agriculture: Delaware" as a standard form for the state bulletins on agriculture and

withdraws that portion of Recommendation 57 which advised the use of type smaller than ordinary text type for reading matter to appear in this series of bulletins. It recommends that the text on wool and mohair be omitted.

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63. The Committee has inquired of the official in charge of Census printing concerning the service likely to be secured by the Bureau from the Government Printing Office in printing and binding the bulletins and final reports of the Fourteenth Census, and is gratified to learn that no serious delays are anticipated. In view of this favorable outlook the Committee recommends that the Director of the Census reach at an early date a definite understanding with the Public Printer concerning the total volume of printing required to present the results of the Fourteenth Census, the time to be allowed for the various operations, and the best method of scheduling the work in order that it may all be produced prior to July 1, 1922.

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64. The Committee recommends that the final reports of the Fourteenth Census be printed in quarto size, and that the weight of paper used in these reports be reduced (at least in all copies issued for general distribution) to 30 pounds per ream, of a size 25 by 38. The use of paper of the weight proposed is regarded by the Committee as an urgently needed reform at this census. It will tend to minimize the inconvenience now experienced by all users of census volumes owing to the weight and bulk of final reports. There appears to be no practical objection to the use of paper of the weight proposed; increased cost per pound, for example, is approximately offset by reduced weight. The Committee considers that minor objections, if any appear, should not be permitted to prevent effecting this change which is certain to prove of great importance to all users of census final reports.

a. The Committee further recommends that if the Director approve of the foregoing recommendation, steps be taken at once by him to secure the coöperation of the Public Printer and, if necessary, of the Joint Committee on Printing, in effecting this reduction in the weight of paper to be used in the reports of the Fourteenth Census.

NOTES

THE MEAN STATURE OF AMERICAN MALES

By Charles B. Davenport, *Carnegie Institution of Washington*

The stature of a person has long been regarded as his most important single measure. From the time when we first walk, up to maturity, we use it as a measure of growth and development. In mature life it influences our standing among men, our vocations, our apparel. Adult stature varies with conditions of development; it is profoundly influenced by heredity, also, and, indeed, forms an important distinction of race. Thus, while the men of the north of Scotland average nearly 70 inches in stature, Japanese males do not much exceed 62 inches. Norwegians at 68 inches contrast with Polish Jews at 63 inches. In general, the "Nordic" population, with its blond hair and blue eyes, is the tallest in Europe; the Apline race comes next; the Mediterranean is still shorter; and the Asiatic races are the shortest of all the main races. In Europe, especially, the average stature of the men of a country has a considerable ethnographic interest.

The population of the United States is now a great mixture of human races—such a mixture as the world has never before seen. It includes Nordics and Mediterraneans, Negroes and Asiatics, and Asiatic-blends from Southeastern Europe. In such a population the *average* stature of males would seem to have little significance because the population is made up of such varied components. Nevertheless, there is an interest attaching to the mean stature of American males if only on account of the insight it gives into the relative proportion of the different racial components of our population. And the change in mean stature of this population from period to period gives a rough index of the racial change.

The selective draft by which our army was raised in 1917–18 gave the first opportunity in half a century to measure an adequate number of American adult males in about the proportions in which they occur in the population as a whole. Over four million males from 18 to 30 years of age were thus measured, and the surgeon-general of the army has in his keeping the records of stature, weight, and chest girth of 2,500,000 of them. The data have been tabulated for the first million draft recruits (ages 21 to 30 years inclusive) and the mean found to be 67.49 inches.

In this average all ages, white and colored, and all European races

are lumped. Within the given limits of age, the age-differences of stature are not very significant for our present purpose. The average stature of white and colored is the same within five-hundredths of an inch, if we may judge from measurements made on 1,000,000 men at demobilization. The figure given is merely the average stature of young adult American males in 1917–18.

A natural inquiry is: How does the stature of draft recruits of 1917–18 compare with that of recruits of the Civil War, 1861–64, fifty-five years earlier? The mean stature of 1,104,841 white recruits of the Civil War was, according to Gould (1869, p. 105), 67.64 inches. To conclude that the average stature of our male population has diminished only 0.15 inches would be unjustifiable, however, because the men measured in 1861–64 are not comparable, as a whole, with those measured in 1917–18. First, because the population of Civil War recruits excluded the southern states which were in rebellion, while the population of 1917–18 includes them. Now it is just these southern states that, in 1917–18, show the tallest average stature; and the inclusion in the later data (and not in the earlier) of several states with a mean stature three-fourths of an inch above the average tends to raise unduly the 1917–18 mean stature as compared with that of the Civil War. Second, while relatively few of the first million recruits of the World War were under 21 years of age, there were 351,175 out of 1,104,841, or 31.78 per cent, of the recruits of the Civil War who were under that age. Many men under 21 have not reached their full stature, and the exclusion of such men from the later mass of data tends to raise its average.

A juster basis of comparison of the mean stature in the two epochs is that between the individual states, and accordingly the following table has been drawn up. It is based on Gould's Table I for the Civil War data, and on the Selective Draft data for 1917–18, and reveals a certain measure of stability in the order of average male statures in the different states, even during the course of half a century. In both the earlier and the later series Iowa, Kentucky, Missouri, and West Virginia stand near the top of the list (of these northern states), and Connecticut and Rhode Island at the very bottom. New York, Pennsylvania, and Massachusetts stand low in both series, the effect of the immigration of South Irish and South German stock being already evident in 1861–64. On examining the difference column it appears that there is an increase in mean stature in Minnesota, due to recent Scandinavian immigration thither; Wisconsin shows little change in mean stature because the increase of Scandinavians has counterbalanced the effect of the shorter immigrants. New Jersey's increase

COMPARISON OF STATURE (IN INCHES) OF NATIVE AND FOREIGN-BORN, WHITE AND COLORED DRAFT RECRUITS, UNITED STATES, 1917–18; AND WHITE RECRUITS OF THE CIVIL WAR (GOULD, TABLE I), BY STATES IN ORDER OF 1917–18 AVERAGE STATURES (LOUISIANA OMITTED ON ACCOUNT OF SCANTY DATA IN GOULD'S TABLE)

State	Stature		Difference
	1917–18	1861–64	
Minnesota	68.04	67.63	+.41
Iowa	68.04	68.13	−.09
Kentucky	68.02	68.16	−.14
Missouri	67.95	68.03	−.08
West Virginia	67.87	68.43	−.56
Indiana	67.75	68.06	−.31
Wisconsin	67.60	67.65	−.05
Illinois	67.40	67.97	−.57
Ohio	67.38	67.84	−.46
Maine	67.28	68.12	−.84
Michigan	67.23	67.62	−.31
Vermont	67.12	67.61	−.49
Maryland	67.08	67.31	−.23
New Hampshire	66.97	67.40	−.43
New Jersey	66.77	66.58	+.19
Massachusetts	66.76	67.05	−.29
New York	66.72	67.09	−.37
Pennsylvania	66.72	67.14	−.42
Connecticut	66.71	67.09*	−.38
Rhode Island	66.40	67.09*	−.69

is probably due chiefly to its large commuting population, the overflow of the best of the metropolis which has attracted great numbers of men of exceptionally fine physique. On the other hand decreases in average stature have occurred as follows: Illinois, .57 inch; Ohio, .46 inch; Rhode Island and Connecticut, about .69 and .38 respectively; New York, .37; Indiana, .31; Michigan, .31; Massachusetts, .29. These are the states which have received most of the recent immigration of the Mediterraneans, Polish-Jews, and Balkanese. The great reductions in Maine, New Hampshire, and Vermont are due chiefly to the immigration of the French-Canadians into these states.

To secure the adjusted and more accurate difference between the statures of 1917–18 and 1861–64 by applying the corrections mentioned above, the following formula may be useful:

$$\text{Difference} = \frac{\Sigma[\Delta f]}{F} - J.$$

In this formula, Δ is the difference in the state statures from the table; "f" is the population of the corresponding state in 1910; "F" is the population of the United States proper in 1910; and "J" is the reduction of the 1917–18 stature to be made because of the absence of the juvenile statures included in the 1861–64 data.

Two assumptions have to be made in utilizing the above formula.

*Data for Rhode Island and Connecticut consolidated, 67.09.

First, that the population of the mountain and Pacific states was negligible at the time of the Civil War, and this involves no great error. Second, that in the southern states no change has occurred in the mean stature of the population between 1861–64 and 1917–18. The latter is, of course, not strictly true. It is true, however, that the change in mean stature of the population of these states has been slight as compared with northern states. A comparison of the statistics of 1917–18 with Coolidge's (1856) army recruiting statistics of 1839–55 suggests an increase in stature for Tennessee, Alabama, North Carolina, and Virginia, and a decrease for Georgia and South Carolina. Little stress should be laid on these differences, however, especially since for some reason in the states where comparisons can be made Coolidge's averages all run lower than those of Civil War recruits taken a few years later. It is probable that the army recruits of 1839–55 were not a fair representation of the male population in respect to stature. Be that as it may, utilizing the assumption just named the value of $\frac{\Sigma[\Delta f]}{F}$ is found to be -0.1799 inches.

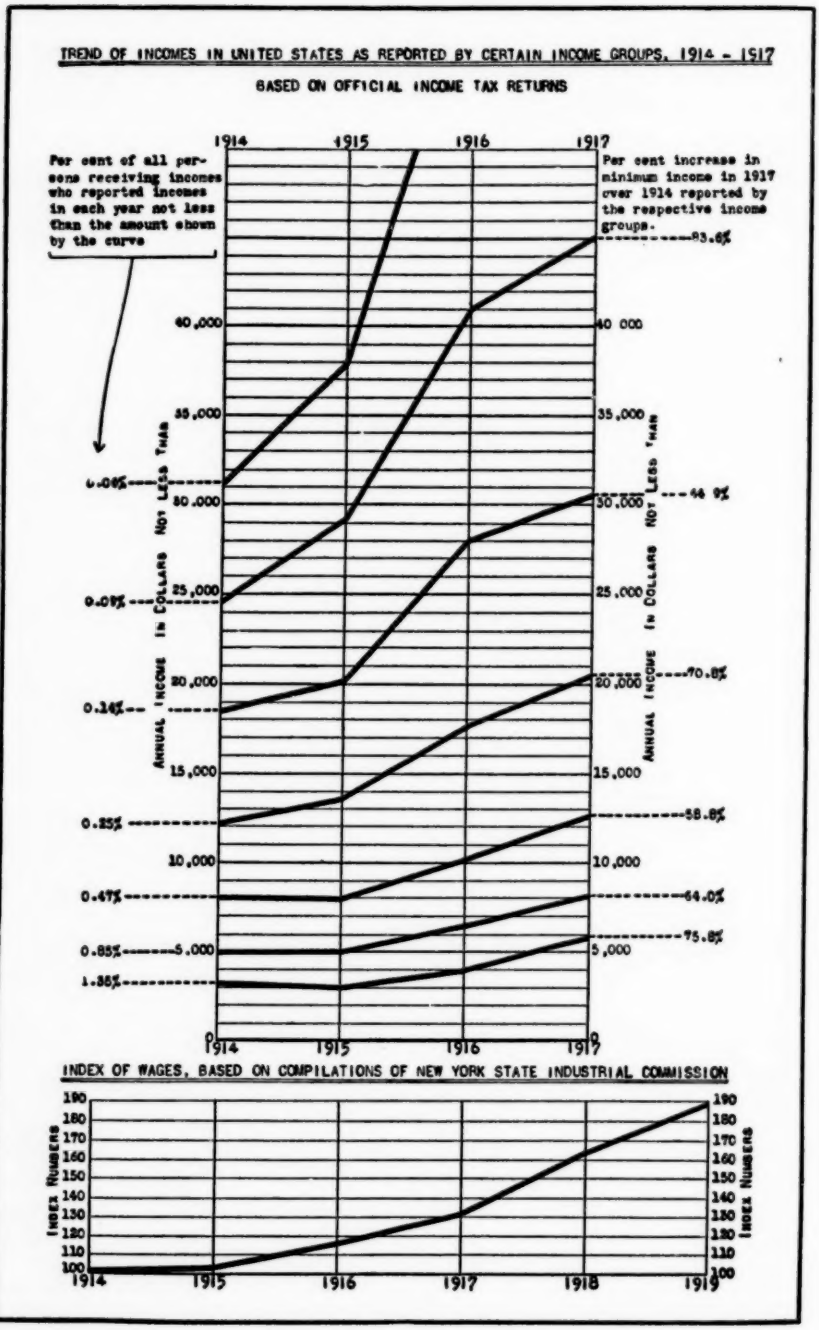
The value of "J" is found as follows. From Gould's data (1869, p. 105), recruits under 21 years of age were 0.997 inches shorter than recruits 21–30 years, the exclusive ages of recruits of 1917–18. Such men under 21 constituted 31.78 per cent of the total. Hence, they reduced the mean stature of the 1861–64 recruits by 0.997 x .3178, or 0.3168 inches. Adding the two quantities (0.18 and 0.32) for which correction must be made, we gain as the most probable reduction of mean stature of men 21–30 years old in the United States during the past 50 years, half an inch. This is one physical result of the "new immigration."

A NEW ANALYSIS OF PERSONAL INCOME TAX RETURNS

By M. C. Rorty

The accompanying chart represents an attempt to analyze personal income tax returns in such manner as to show the percentages of increase in the larger incomes during the war period. For this purpose, use has been made of the shift from year to year in the dividing lines between comparable groups of income taxpayers. Referring to the chart, it will be seen, for example, that in 1914, .09 per cent of the actual and potential income tax payers (heads of families, etc.) had incomes of $24,700 or more. In 1915 the same percentage of all possible income taxpayers (allowing for increases in population) had incomes of $29,200 or more. In 1917 this percentage of income taxpayers had incomes of $45,000 or more. The increase in the base line for the group had, therefore, been 83.6 per cent during the period from 1914 to 1917.

For comparison with the figures as to incomes, there has been plotted at the bottom of the chart an index of wage increases from 1914 to 1919.


TREND OF INCOMES IN UNITED STATES AS REPORTED BY CERTAIN INCOME GROUPS, 1914 - 1917
BASED ON OFFICIAL INCOME TAX RETURNS
1914
1915
1916
1917
Per cent of all persons receiving incomes who reported incomes in each year not less than the amount shown by the curve
Per cent increase in minimum income in 1917 over 1914 reported by the respective income groups.
93.8%
44.9%
70.8%
58.8%
64.0%
75.8%
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0.06%
0.09%
0.16%
0.25%
0.47%
0.85%
1.36%
ANNUAL INCOME IN DOLLARS NOT LESS THAN
INDEX OF WAGES, BASED ON COMPILATIONS OF NEW YORK STATE INDUSTRIAL COMMISSION
INDEX NUMBERS
190
180
170
160
150
140
130
120
110
100
1914
1915
1916
1917
1918
1919

It may be expected that, as such charts are carried forward by the addition of figures for 1918 and 1919 personal incomes, there will be, at least in 1919, a downward trend in the income curves, while the wage index will still be rapidly rising. This follows from the fact that the higher incomes are very largely the product of industrial and commercial profits rather than salaries.

When final data for the war period are at hand, it will be desirable to complete the analysis by deducting income taxes from the gross income figures in order to show the final effect of war conditions on the relative net sums available for personal expenditure by the recipients of large and small incomes.

It should be noted, in conclusion, that total possible income taxpayers were estimated for the purposes of the chart by dividing the total population of the continental United States by four. This is a rough approximation, only, but any error involved does not affect the form of the curves.

PROGRESS OF THE POPULATION CENSUS

In the last issue of the QUARTERLY there was a brief statement regarding the progress of the Fourteenth Census. The subject, it may be assumed, is one of great interest to the members of the American Statistical Association, and in response to the Editor's request the following statement has been prepared covering some of the more important features of the work on the population census.

In the tabulation of the population returns the first important step after the schedules have been received and inspected is the hand-count of names. On the basis of this count the population of each state, county, city, and smaller civil division is ascertained and the results are announced as the work progresses. This task was completed about the first of October and on the seventh of that month the Bureau of the Census announced the total population of the United States, 105,683,108. The figures are subject to revision, but there is not likely to be any material change in the total. Comparison with a population of 91,972,266 in 1910 and of 75,994,575 in 1900 shows an increase of 15,977,691 or 21.0 per cent from 1900 to 1910, as against an increase of 13,710,842 or 14.9 per cent from 1910 to 1920, the falling off in the rate of growth being attributable mainly to the almost complete cessation of immigration during the five years preceding the taking of the census.

Following this population count the cards are punched for the detailed tabulation by sex, color, nativity, illiteracy, school attendance, etc. The card punching, which is the largest single task in the population work next to the field work of enumeration, was begun on March 1 and was practically completed by October 1.

The next important step in the process of tabulation is the machine verification of the punched card known as the "verification run," in which the electrical machines are wired so as to reject automatically any card which lacks the required number of punched holes, also any card which is "off gauge," *i. e.*, not punched with the mechanical exactness required for the tabulating machines, and any card on which the recorded data, as indicated by the punched holes, involve some apparent inconsistency, as when, for instance, a card is punched as "widowed" or as "married" and "under 15 years of age." The cards thus rejected for inconsistencies or improbabilities are compared with the entries on the schedules as filled out by the enumerator and, if error is discovered, are corrected. The verification run was begun on the seventeenth of April and is practically completed.

Although this run is, as just explained, primarily for the purpose of eliminating defective or erroneously punched cards, it yields what might be termed a valuable

statistical by-product in the shape of an enumeration of the population by race or color, so that on the basis of the results of this run the Bureau is in position to announce the Negro, Indian, Chinese, and Japanese population. These figures, however, are subject to revision. Announcements of this kind have already been made for many of the states and cities. This, it may be added, is something new in census practice as no similar announcements were made ten years ago at this stage of the work.

The first count of the cards, or first tabulation run, shows age groups, illiteracy, school attendance, dwellings, families, and ownership of homes for the population classified by sex, race, general nativity (native and foreign-born), and parentage (both parents native, both foreign-born, one native and one foreign-born). The preparatory sort of the cards for this run—a sort by sex, color or race, nativity and parentage—is well advanced and the run itself has been begun. Readings are taken off for each county, each incorporated city, town, or village of over 2,500 inhabitants and each ward in cities of over 50,000 inhabitants.

The second count or run of the cards will cover the foreign-born white population only, and will give the classification by country of birth. It may be noted that these two runs give all the population detail that will be shown or will be available for counties and for the small cities and villages, since in the later runs the arrangement of the cards by counties is lost and readings are taken off only for the state, the individual larger cities, the smaller cities as a group, and the rest of the state or rural area.

The plans for the publication of the results of the population census provide for two series of state bulletins. The first series, based upon the hand count of names, gives the population of the counties, cities, villages, and townships, and other minor civil divisions, with a classification of the total population of the state as urban and rural and by classes of cities. At this date (December 1) six bulletins in this series have been published and nineteen more are in type.

The second series of state bulletins, based upon the first two counts of the cards, will present data as to race, sex, nativity, age, illiteracy, school attendance, citizenship or naturalization, and number of dwellings and families. The amount of detail to be included in this series has been a subject of careful consideration by the officials of the Bureau and the members of the Advisory Committee, and the results of their deliberations are crystalized in the "one-page stub," which was formulated with the idea of selecting as many of the most important available items as could be brought within the length of a single page. The stub is as follows:

COLOR OR RACE, NATIVITY, AND SEX

Total population
- Male
- Female

Native white
- Male
- Female
- Native white—Native parentage
- Native white—Foreign parentage
- Native white—Mixed parentage

Foreign-born white
- Male
- Female

Negro
- Male
- Female

Indian, Chinese, Japanese, and all other

Per cent native white
Per cent foreign-born white
Per cent Negro

1910: Total population
- Native white
- Foreign-born white
- Negro
- Per cent native white
- Per cent foreign-born white
- Per cent Negro

AGE, SCHOOL ATTENDANCE, AND CITIZENSHIP

Total under 7 years of age
Total 7 to 13 years, inclusive
- Number attending school
- Per cent attending school

Total 14 and 15 years.....
  Number attending school.....
  Per cent attending school.....
Total 16 and 17 years.....
  Number attending school.....
  Per cent attending school.....
Total 18 to 20 years, inclusive.....
  Number attending school.....
  Per cent attending school.....

Males 21 years of age and over.....
  Native white—Native parentage.....
  Native white—Foreign or mixed parentage.....
  Foreign-born white.....
    Naturalized.....
    First papers.....
    Alien.....
    Unknown.....
  Negro.....
  Indian, Chinese, Japanese, and all other.....
Females 21 years of age and over.....
  Native white—Native parentage.....
  Native white—Foreign or mixed parentage.....
  Foreign-born white.....
    Naturalized.....
    First papers.....
    Alien.....
    Unknown.....
  Negro.....
  Indian, Chinese, Japanese, and all other.....
Males 18 to 44 years, inclusive.....
Females 18 to 44 years, inclusive.....

ILLITERACY

Total 10 years of age and over.....
  Number illiterate.....
  Per cent illiterate.....
  Per cent illiterate in 1910.....
  Native white.....
    Number illiterate.....
    Per cent illiterate.....
  Foreign-born white.....
    Number illiterate.....
    Per cent illiterate.....
  Negro.....
    Number illiterate.....
    Per cent illiterate.....
Total 16 to 20 years, inclusive.....
  Number illiterate.....
  Per cent illiterate.....

Illiterate males 21 years of age and over
  Per cent of all males 21 years of age and over.....
  Native white.....
  Foreign-born white.....
  Negro.....

Illiterate females 21 years of age and over
  Per cent of all females 21 years of age and over.....
  Native white.....
  Foreign-born white.....
  Negro.....

DWELLINGS AND FAMILIES

Dwellings, number.....
Families, number.....

The above detail will be presented for every county and every city of over 10,000 population, and a separate table will give a classification of the foreign-born white population by country of birth. For smaller cities, those from 2,500 to 10,000 population, a half-page stub is to be used showing less detail. It will be several months before this second series of state bulletins will begin to appear, as their publication must await the completion of the second run of the cards.

Regarding the census of agriculture it may be stated, without going into details, that the card punching is about two-thirds completed and the first state bulletin has already been published. A fuller account of progress will perhaps be prepared for the next issue of the QUARTERLY, with some account of the census of manufactures, which has not yet reached the stage of publishing state bulletins, although press announcements are being made.

In general, progress on the census up to date may be regarded as satisfactory. For although the announcement of the total population of the United States was relatively a few days later than in the Thirteenth Census, and the population card punching was not completed quite so soon as it was ten years ago, the beginning of the publication of the first series of population bulletins and of agricultural bulletins is fully three months ahead of the corresponding dates in the census of 1910, allowing for the difference in the dates on which the two censuses were taken, and it is believed that the bulletins will be issued more rapidly than was the case before. The announcement of the total population of the country was delayed in some degree by

the unusually large number of complaints and demands for a recount coming from communities where there was disappointment over the fact that the population announced by the census was below expectations and it was claimed that there had been serious omissions. In few instances did these claims prove to be well founded, but the investigation of these numerous cases was naturally a cause of delay.

J. A. HILL.

AN AMERICAN ACCIDENT TABLE

When the National Council on Workmen's Compensation Insurance undertook the task of revising rates for workmen's compensation insurance in the various states, it became necessary for them to calculate the value of amendments to the compensation laws. Up to this time Dr. Rubinow's Standard Accident Table had been used as the necessary basic distribution of industrial accidents. This table was compiled in 1914 and, because very few American data were available at that time, was based almost entirely upon European statistics.

The boards and bureaus having jurisdiction over compensation insurance in the United States felt the necessity of a distribution based on American experience and through their efforts to secure reports compiled on a uniform basis enough material was available in 1919 for the compilation of an American Accident Table. Most of the boards and bureaus having control of the manner in which the insurance companies shall report their workmen's compensation experience now require that such report shall be made on a form known as Schedule "Z." In 1919 Schedule "Z" called for number of fatal, permanent total, permanent partial, and temporary total cases compensated during policy years 1916 and 1917 in each state. The combined reports of all companies showed a total of 271,173 compensatable cases. However, waiting periods vary from state to state and it was desirable that a standard accident table should be based on number of tabulatable accidents, that is, all accidents resulting in disabilities lasting longer than the day or shift during which the accident occurred. Adjustments were made to eliminate the effect of waiting periods and the results, reduced to the basis of 100,000 tabulatable accidents, show 762 fatal, 62 permanent total, 3,788 permanent partial, and 95,388 temporary total cases.

For the distribution showing duration of disability in temporary total cases no information was available except the reports of state industrial accident commissions. The difficulty of coördinating these various records made it necessary to discard many of the reports. However, a total exposure of 475,423 temporary total cases was available. Only two states reported duration of temporary total in permanent partial cases, but the indications followed so closely the tabulation of the Standard Accident Table that the material was used for the purpose of valuing the cost of amendments.

The Travelers Insurance Company of Hartford, Conn., furnished a tabulation of 9,464 permanent partial disabilities from their experience in all states from January 1, 1916, to June 30, 1919. It was possible to combine with this report the reports of the Wisconsin Industrial Commission for 1914 to 1918, so that the combined data showed a total of 12,923 cases. With this as a basis, a table was compiled distributing 3,788 cases of permanent partial disability according to nature of injury.

Schedule "Z" required insurance companies to make an individual report for every fatal accident, stating relationship and age of each dependent. From this information it was possible to compile a distribution of dependents, and also to obtain the average age of such dependents.

The following table shows the results of this study:

General Distribution

Fatal		762
Permanent total		62
Permanent partial		3,788
Major permanent partial	924	
Minor permanent partial	2,864	
Temporary total		95,388
		100,000

Duration of Temporary Total Disability

Temporary Total		*Permanent Partial*	
Duration	*No. Cases*	*Duration*	*No. Cases*
1 day	8,823	1 week or less	206
2 days	8,086	1–2 weeks	171
3 "	7,282	2–3 "	270
4 "	6,014	3–4 "	362
5 "	5,255	4–5 "	380
6 "	4,606	5–6 "	324
7 "	4,807	6–7 "	273
8 "	3,090	7–8 "	224
9 "	3,074	8–9 "	193
10 "	2,740	9–10 "	166
11 "	2,475	10–11 "	141
12 "	2,275	11–12 "	122
13 "	1,868	12–13 "	105
14 "	2,190	13–14 "	92
2–3 weeks	10,925	14–15 "	71
3–4 "	6,269	15–16 "	59
4–5 "	4,345	16–17 "	51
5–6 "	2,674	17–18 "	48
6–7 "	1,923	18–19 "	45
7–8 "	1,298	19–20 "	41
8–9 "	966	20–21 "	39
9–10 "	745	21–22 "	37
10–11 "	549	22–23 "	34
11–12 "	447	23–24 "	33
12–13 "	358	24–25 "	31
13–14 "	296	25–26 "	30
14–15 "	254	6–7 months	79
15–16 "	216	7–8 "	52
16–17 "	182	8–9 "	39
17–18 "	154	9–10 "	29
18–19 "	131	10–11 "	22
19–20 "	110	11–12 "	19
20–21 "	94		
21–22 "	79		3,788
22–23 "	68		
23–24 "	56		
24–25 "	45		
Over 25 "	609		
	95,388		

Permanent partial disability		3,788
Dismemberment or loss of use	2,704	
Arm	61	
Hand	86	
Thumb	96	
One phalange of thumb	152	
Index finger	301	
One phalange index finger	261	
Second finger	147	
One phalange second finger	172	
Third finger	104	
One phalange third finger	89	
Fourth finger	119	
One phalange fourth finger	65	
Thumb or finger and loss of or injury to other fingers	532	
Leg	62	
Foot	43	
Great toe	37	
One phalange great toe	16	
One toe other than great toe	19	
One phalange of toe, not great toe	11	
One toe and loss of or injury to other toes	35	
Hearing, one ear	5	
Hearing, both ears	1	
Eye	290	
Disfigurement	50	
Other permanent partial	1,034	

Distribution of Fatal Cases

No dependents		174
Widow alone		177
Widow and children		253
Widow and one child	79	
Widow and two children	68	
Widow and three children	47	
Widow and four children	28	
Widow and five children	17	
Widow and six or more* children	14	
Orphans		26
One orphan	13	
Two orphans	6	
Three orphans	3	
Four orphans	2	
Five orphans or more†	2	
Widow and other dependents		4
Widow and one parent	1	
Widow and children‡ with other dependents	3	

* Average number of children, 7.
† Average number of orphans, 6.
‡ Average number of children, 2.

Parents and or brothers or sisters		125
One parent	66	
Two parents	35	
One brother or sister	7	
Two brothers or sisters	2	
Three or more* brothers or sisters	1	
One parent and one brother or sister	5	
One parent and two brothers or sisters	3	
One parent and three or more brothers or sisters	2	
Two parents and brothers or sisters†	4	
Other dependents‡		3
Total		762

OLIVE E. OUTWATER.

ORGANIZATION OF THE DIVISION OF STATISTICS IN THE MASSACHUSETTS DEPARTMENT OF LABOR AND INDUSTRIES

On December 1, 1919, the Massachusetts Bureau of Statistics passed out of existence and its functions were transferred to other departments of the state. This Bureau, organized in 1869 as the Bureau of Labor Statistics, was the first governmental agency to be established "for the gathering and compilation of statistical data relating primarily to the welfare of the wage-earning classes of the population."§ Other states and foreign countries soon after established similar bureaus, closely following the plan of organization and the methods of procedure of the Massachusetts Bureau.

In place of a Bureau of Statistics Massachusetts now has a Division of Statistics which is included in the Department of Labor and Industries. The Division of Statistics as now organized includes certain of the original functions of the Bureau of Labor Statistics and comprises the following branches:

Labor Statistics, for the collection and tabulation of statistical and other information relating to matters affecting labor conditions and questions of general economic and social interest. The data collected are published in labor bulletins which are numbered consecutively as issued. Each number is devoted to a single subject and at the end of the year they are bound together under the title *Annual Report on the Statistics of Labor*. In addition to the labor bulletins, quarterly reports relative to industrial conditions in the Commonwealth are issued under the title *Massachusetts Industrial Review*. This Review takes the place of the former *Quarterly Reports on Employment* and affords a medium for the early publication of summary data obtained in connection with various investigations, the results of which are published later in greater detail.

Manufactures Statistics, for the collection and tabulation of statistics of manufactures (published annually under the title *Report on the Statistics of Manufactures*),

* Average number of brothers and sisters, 4.

† Average number of brothers and sisters, 3.

‡ Average number of dependents, 3.

§ *The History of Statistics, its Development and Progress in Many Countries*, an article by Charles F. Gettemy, entitled "The Work of the Several States of the United States in the Field of Statistics," p. 692. Mr. Gettemy, who for twelve years served as director of the Bureau of Statistics and under whose direction it was brought to a high standard of efficiency, resigned in July, 1919, to accept a position as assistant federal reserve agent of the Boston Federal Reserve Bank.

and the compilation of an industrial directory (an up-to-date copy of which is kept in the office).

Department Library, a reference collection on industrial and economic subjects for the use of the entire department and the public. This collection includes the large number of publications which had been accumulated by the Bureau of Statistics since 1869 and special libraries of other offices now consolidated in the new department.

Public Employment Service, for the purpose of assisting employers in securing competent help and aiding workers to obtain positions. There are three State offices located, respectively, in Boston, Springfield, and Worcester. The operation of public employment offices was part of the work of the former Bureau of Statistics, and in the absence of a separate Division of Employment the administration of these offices has been assigned to the director of statistics, who acts also as assistant federal director for Massachusetts of the United States Employment Service with which the State offices work under a coöperative agreement.

The work of the former Bureau included also the taking of the Decennial Census of the Commonwealth, now transferred to the Secretary of the Commonwealth,* and the duties of compiling municipal statistics, of auditing municipal accounts and certifying notes of towns and districts, now undertaken by the Department of Corporations and Taxation.†

ROSWELL F. PHELPS.

Massachusetts Department of Labor and Industries.

THE FIRST NUMBER OF *METRON*

The appearance of the first number of *Metron*, the new international review of statistics, is an event in the development of statistical science deserving note. The object of *Metron* is to afford a common *locus* for "original articles on statistical methods and on the application of statistics to the different spheres of activity,"—articles published in the organs of the particular sciences with which they deal and not readily accessible to those interested in the application of statistics to other sciences—"and reviews or discussions of results obtained by statistical methods in various fields of science, or such material as may be of interest to the statistician." It publishes articles in English, French, German, and Italian. "The sole necessary condition of approval for publication is that papers shall make a contribution to the theory or practice of statistics of original value and likely to interest a greater or smaller number of students of statistics."

The first number contains the following articles:

L. March. "La méthode statistique"—a discussion of the foundations of statistical methodology by the director of the French statistique generale, dividing methods of statistical analysis into three categories: (1) comparison of groups of observations by means of centering constants; (2) study of variability within the group; and (3) study of correlations.

E. Czuber. "Ueber Funktionen von Variablen zwischen welchen Korrelationen bestehen." The author derives formulae for the mean and standard deviation of a function of correlated variables. The paper is a generalization of Pearson's formulae for the mean and standard deviation of an index.

F. Vinci. "Sui coefficienti di variabilità"—a discussion of two functions for measuring variability.

* Massachusetts Acts, 1919, Chapter 350, Section 25.

† *Ibid.*, Section 52.

F. Y. Edgeworth. "Entomological Statistics"—a continuation of the author's studies already published in other places on the average duration of expeditions of wasps from the nest.

C. Gini. "La coscrizione militare dal punto di vista eugenico." Gini shows that conscripts marry later, but have more children than those excused from military service. Military conscription in Italy, therefore, is not necessarily dysgenic in its results.

G. H. Knibbs. "The theory of large population-aggregates." Knibbs points out that constant rate of increase of population cannot continue for long, owing to limitation of natural resources, and that pressure of population is an important cause of war.

G. Zingali. "Della misura statistica dell' abilita dei giocatori nelle corse al galoppo." This novel paper attempts to evaluate, for whatever purposes the reader may care to put the results to, the relative abilities of jockeys performing in the principal Italian racing classics.

J. Bourdon. "La fiscalité de guerre (discussion)"—a general discussion of certain economic problems of the late war.

F. P. Cantelli. "Sulle applicazioni del calcolo delle probabilita alla fisica molecolare"—a résumé of the work of various investigators in the field of molecular physios.

C. Gini. "Ridolfo Livi (1856–1920)"—an obituary of the eminent physical anthropologist with bibliography of his writings.

Altogether it is apparent that if the catholicity of interest and the high quality of the articles in this first number are maintained, the future of *Metron* is assured. The general appearance and the typography of the journal are excellent. There is one editorial matter which should be changed. Following a somewhat general but not universal Italian practice, the author's name is placed at the end of his article instead of at the beginning. From a working bibliographic standpoint such an arrangement is most unfortunate. Whatever, if anything, may be said in its favor in a purely literary journal or review, it has no place in a scientific journal.

An examination of this first number makes it apparent that *Metron* will fill a real gap in statistical literature and will be required on the library shelves of every serious worker in statistical fields.

AN EMPLOYMENT INDEX FOR WISCONSIN

The Industrial Commission of Wisconsin, beginning July, 1920, has been collecting monthly data on employment conditions. There are reporting about 170 employers with over 80,000 shop employees—about 30 per cent of the total number employed in the state—and a weekly payroll of $2,500,000. The data will be handled in much the same manner as it is in the *New York Labor Market Bulletin*. The number of employees and the total payroll will be compared each month, and average earnings will be compared with the cost of living. The Wisconsin bulletin, however, will differ from the New York bulletin in two respects: the material will be presented in a less technical manner, and instead of the retail food price index of the Bureau of Labor Statistics, a monthly cost-of-living index, which will be constructed from the semi-annual cost-of-living index of the U. S. Bureau of Labor Statistics as modified by the monthly changes in the cost of living reported by the National Industrial Conference Board, will be used.

The first bulletin, issued in October, contains two graphs which show the trend of employment since January, 1915. It was possible to secure data as far back as 1915, from employers representing between 15 and 20 per cent of the payroll of the state.

One graph shows total number employed and total wages paid from January, 1915, to July, 1920. During this period the number of employees increased 43 per cent and the total wages paid increased 257 per cent. This graph is in general agreement with the New York one. There is the same sharp drop in number of employees and wages paid during the spring of 1919, the subsequent recovery up to March, 1920, and the gradual decline since that month. The other graph compares average weekly earnings with retail food prices during the same period. Earnings in July, 1920, show an increase of 150 per cent over January, 1915, while food prices show an increase of only 112 per cent.

This work is in charge of A. J. Altmeyer, Chief Statistician of the Wisconsin Industrial Commission, Madison, Wis., from whom copies of the bulletins as issued may be secured.

THE SIGNIFICANCE OF SOME RECENT SMALLPOX STATISTICS FOR THE PACIFIC COAST

Recent statistics of smallpox in the Pacific Coast states will be interesting to members of the Association. In California during 1917, 329 cases were reported; in 1918 there were 1,172, and in 1919, 2,001. In relation to population, the situation in Oregon was even worse. In 1917, 122 cases were registered; in 1918 there were 497; and in 1919, 2,626 smallpox notifications were received by the health authorities. In the state of Washington during 1917 there were 390 cases; during 1918 there were 1,676, and during 1919, 4,369.

Yet, in the face of this great increase in the prevalence of the disease, certain groups in the Pacific Coast communities have this year conducted campaigns for anti-vaccination constitutional amendments in California and in Oregon. Each would take from the constituted health authorities the scant police powers they now possess to control the smallpox menace. In California, the anti-vaccination amendment to the state constitution was so drawn that health officers would not be permitted to keep from schools and other places of instruction and from public offices not only those who had not been satisfactorily vaccinated against smallpox but also those who were actually suffering from a mild attack of smallpox or other infectious disease. The Oregon amendment was even more drastic in its terms. There it was proposed to prohibit "vaccination, inoculation or other form of medication" as a condition of entrance or attendance at any school, college, educational institution, or as a condition of "the employment of any person in any capacity, or for the exercise of any right, the performance of any duty or the enjoyment of any privilege." The amendment would repeal all provisions constitutional, statutory, municipal, of charter or ordinance in conflict with it. As "medication" would, in all likelihood, include any sanitary measure which a health officer might exercise in the performance of his duties, the effect of the passage of this amendment would be to prevent the removal and isolation of any person suffering from smallpox in a lumber camp, or of a child sick with diphtheria and attending school, or of a teacher in an advanced stage of tuberculosis at work among his or her pupils. The advocates of these anti-vaccination amendments have for many years worked covertly, but in the present political campaign they chose to challenge public health work in the open. Both those who were animated by sincere if misguided conviction, and those who profit financially from discrediting public health work, have had the confidence to come out openly for a test of power.)*

There is a strong statistical argument in favor of vaccination. The experience of

* Since the above was written, the people of California and of Oregon have defeated the anti-health amendments referred to by unmistakable majorities.

the people of Cuba is perhaps one of the best examples we have of the efficacy of vaccination. In 1896 and in 1897 there were over one thousand deaths each year from smallpox in the City of Havana alone. With the beginning of American occupation of the island vaccination was enforced; children were compelled to be vaccinated as were also all persons who could not produce satisfactory evidence of previous inoculation. The beneficent effect of this procedure was observed almost at once. Between 1901 and 1917 there was only one death from smallpox in the City of Havana. In Japan a similar condition was observed. Before vaccination was effectively carried out, Japan had thousands of cases and deaths each year. Epidemics of the disease were especially severe. In 1909 a law was passed requiring vaccination of each infant within three months after birth. This measure alone apparently had the effect of greatly reducing the number of cases and deaths. There have been no serious epidemics from smallpox in Japan since vaccination was generally introduced.

Sanitary statistics also show that in the United States and Canada there are no centers of smallpox infection where vaccination has been thoroughly tried out and that no epidemics have commenced in these protected centers. On the other hand, in cities where there is great laxity in the enforcement of vaccination laws, or where there are no laws to be enforced, many cases occur each year. In the Province of Ontario where there has been persistent opposition to vaccination, a very severe outbreak occurred early this year and the United States sanitary authorities declared a quarantine on all travelers from that province into the United States.

It is hoped that members of the Association will interest themselves in the collection of the facts concerning smallpox and vaccination and that they will present this evidence forcefully to their communities. Smallpox will be a serious menace to the health of the people of the United States during the winter of 1920–21. There has been a world-wide increase in the number of smallpox cases. At the port of New York several steamers entering the harbor in the summer and early autumn have been quarantined because of the presence of smallpox on board. It should be recalled that during the war people from all parts of the globe were brought together in large numbers and some came from countries where there is always more or less smallpox. The lack of adequate medical and sanitary service in all of the fighting countries of Europe, the unfavorable living conditions arising out of the war, and the marked falling off of universal vaccination have resulted in an increased prevalence of the disease. At the present time smallpox is a real menace to the health and welfare of the people of the United States and Canada. Members of the Association should do everything in their power to bring the facts of the problem to the attention of their health and educational authorities.

LOUIS I. DUBLIN.

MISCELLANEOUS NOTES

The New York City Census Committee. This Committee was formed by resolution of a meeting of representatives of sixty municipal departments and social agencies held at the New York Academy of Medicine, October 2, 1919. It was incorporated "to secure speedy and special tabulation and publication of the Census of New York City, taken as of January 1, 1920, by sanitary districts." Dr. Haven Emerson, former Health Commissioner of New York City, is Chairman of the Committee and Dr. Walter Laidlaw, of the New York Federation of Churches, is its Executive Secretary. The city has been mapped, permanently, into over 3,000 districts, and the Census of 1920 was taken in such a manner as to permit the population of each of these areas to be handled separately and to be grouped into larger areas for specific pur-

poses, as required for educational, health, business, and social needs. The Federal Census Bureau publishers detailed results for assembly districts only, which are political areas, unsuited for other purposes. It is the purpose of this Committee to secure the population data for the small areas and to arrange and publish the results for such groupings as seem most useful. City authorities and others questioned the accuracy of the Federal Census Bureau's count of population in January, 1920, which fell far short of estimates previously made, especially in the case of the Borough of Manhattan which was shown to have actually declined in population. The New York Census Committee appointed the following sub-committee to gather and review available evidence bearing upon the accuracy of the enumeration: Kate H. Claghorn, New York School of Social Work; Frederick B. DeBerard, The Merchants' Association; Louis I. Dublin, Metropolitan Life Insurance Company; Raymond B. Fosdick, New York Federation of Churches; Adna F. Weber, Public Service Commission; Robert E. Chaddock, Chairman, Columbia University. Various lines of inquiry were pursued by this special Committee, and a report was submitted covering the evidence from the growth of transportation facilities, vital statistics, school population, immigration, dwellings, and voting population. Agreement was reached that "the preponderance of evidence seems to indicate that the count was probably as accurate as previous census counts and that the results are not enough in error to invalidate the census." Therefore, in the light of the Committee's findings it would be an unnecessary and unwarranted expense for the city to undertake a recensus of the city or of Manhattan borough.

Foreign Trade Index of the Federal Reserve Board. The need of an analysis of our post-war foreign trade figures has been generally felt for some time past. In order to determine as far as possible the extent to which the increase in our import and export values has been due to price increase, and to furnish certain further analysis of our imports and exports as compared with the year 1913, the Division of Analyses and Research of the Federal Reserve Board has undertaken to prepare and publish monthly what it terms its "Foreign Trade Index," publication having begun in the July *Federal Reserve Bulletin*. The commodities included in this index were chosen largely with the view to practicability of obtaining those goods for which 1913 prices could be had, at the same time, of course, maintaining such a selection as would give a well-balanced sample of our foreign trade. The list of imports included represent 47.7 per cent of the value of imports for 1913, and the commodities of export represent 56.3 per cent of the total export values. The commodities both of import and export are classified as to raw materials, producers' goods, and consumers' goods. The monthly value of the imports of each of these classes and the grand total of all imports and exports included are computed on the average 1913 monthly prices, an index number of such values being then computed on the monthly average of such values for the year 1913. A number of interesting facts relative to changes which have taken place in our foreign trade and to the extent to which we are returning to pre-war conditions as judged by 1913 are revealed by these figures as published monthly in the *Federal Reserve Bulletin*. Perhaps the outstanding feature of the table is the fact that when the influence of fluctuating prices is removed a very decided tendency is shown for our imports to increase, while at the same time our exports have increased in very much lower proportion. During the more recent months, it is true, there is a tendency for both imports and exports to decline. However, this movement is much more marked in exports than in imports. There has been a notable falling off of our exports of raw materials. The value of our exports of these

commodities in 1919, if computed at 1913 prices, were about 11 per cent less than in 1913. The figures as published for each month of the current year up to and including August show no tendency toward a return to our pre-war position. On the other hand, our exports of producers' and consumers' goods show a large increase in 1919 as compared with 1913, even when 1913 prices are used. Only in the month of August is there seen any indication of decline in the exports of these goods. With regard to the import situation, it is found that a large increase has occurred in the case of all classes of commodities, the most notable being in producers' goods. And only in the case of raw materials was there any decided tendency toward a decline during the first eight months of 1920. In fact our imports of producers' goods reached their highest levels during January and February of the present year.

Statistical Work in the United States Public Health Service. The statistical work of several divisions of the United States Public Health Service recently has been consolidated into one office. In 1916 a statistical office was established in South Carolina in connection with field studies of the incidence of pellagra in relation to dietary and economic factors, with Mr. Edgar Sydenstricker in immediate charge of the statistical phases of the pellagra studies. In 1917 the studies were considerably extended in their scope and Dr. Willfred I. King became associated in the work, continuing until 1920. When the pandemic of influenza occurred in 1918, certain epidemiological and statistical studies were begun under the supervision of Mr. Sydenstricker and Dr. Wade H. Frost, and the statistical office, established for this purpose in Washington, developed into a general statistical office for the Scientific Research Division of the Public Health Service. Statistical studies were also inaugurated in connection with the work of the Service in industrial hygiene, child hygiene, venereal diseases, morbidity among industrial wage-earners, and morbidity reporting, and in the Hospital Division in which was centered the administration of marine hospitals and hospitals for the care of disabled soldiers and sailors. In 1920 all of the statistical work in connection with these activities was placed under a single supervising head and the various offices, with their personnel, tabulating, computing, and other equipment were housed in the same building in Washington. The statistical staff at present consists of Mr. Edgar Sydenstricker, Statistician, in general charge; Dr. F. M. Phillips, Associate Statistician, industrial hygiene; Mr. Maurice Leven, Assistant Statistician, hospital statistics; Mr. Dean K. Brundage, Assistant Statistician, industrial morbidity; Mr. Selwyn Collins, Assistant Statistician, child hygiene; Miss Mary L. King, tuberculosis; Miss Dorothy Wiehl, pellagra; Miss Mary H. Louden, influenza; and a clerical force. Associated with this staff are Professor Raymond Pearl, of Johns Hopkins University, and Professor Willfred I. King, as consultants, and Drs. Frost, Goldberger, and others in the Public Health Service.

Health Work in American Cities. There is little definite knowledge of the amount and character of the health and vital statistics work which is carried on even in the larger cities of the United States and Canada. Little is known concerning the amount of money expended, the personnel, the various activities that are undertaken, the particular methods of procedure followed, the results that are obtained under the various systems, and new work that is planned. The American Public Health Association, recognizing the great value to the country at large of an accurate knowledge of municipal health department procedure, has appointed a committee composed of Prof. C. E. A. Winslow, Chairman, Dr. Charles V. Chapin, Dr. Wade H. Frost, Dr. Donald B. Armstrong, Dr. Allen W. Freeman, and Dr. Louis I. Dublin, Secretary,

to investigate and report on this subject. The Metropolitan Life Insurance Company has placed at the disposal of the Association a sum of $5,000 with which to carry out this piece of work. The Committee has surveyed six of the Pacific Coast cities and in a few weeks will have surveyed six of the eastern cities. With the experience thus gained a final revision of the questionnaire is to be prepared. The health officers already visited have shown a great deal of interest in the questionnaire and have gladly answered the list of questions, realizing that the completed report, based upon a careful statistical study of the questionnaires, will be of value in making available to health officers throughout the country the methods in use in other cities. It is felt that the final report will make for greater uniformity in health department practice and will stimulate the introduction of new activities.

International Conference on Causes of Death. The Third Decennial Conference for the purpose of revising the International Classification of Causes of Death and Sickness was held at Paris during the week beginning October 11. Forty countries were represented. A number of important changes in the classification were made as a result of the deliberations of the Conference. Many of them were made at the instance of the American delegation. In fact, the great majority of the changes and improvements recommended by the American Public Health Association Committee on the Accuracy of Certified Causes of Death were adopted. These suggestions may be found in Reprint No. 440 of the *Reports of the United States Public Health Service.* The delegation from Great Britain, which had also given much study to this subject, made many suggestions which were in agreement with those of the American delegation. Among the most important of the changes in the classification of diseases was the transfer of acute poliomyelitis and meningococcic meningitis from the class of Diseases of the Nervous System to a new class to be known as Epidemic, Endemic, and Infectious Diseases. The Commission also provided for the tabulation of lethargic encephalitis as one of the diseases under the same class. The American delegation was as follows: Dr. Herman M. Biggs, Commissioner of Health of the state of New York; Dr. Rupert Blue, United States Public Health Service; Dr. William H. Davis, Chief Statistician for Vital Statistics, United States Census Bureau; Dr. Haven Emerson, Chairman, Committee on the Accuracy of Certified Causes of Death, A. P. H. A.; Dr. William H. Guilfoy, Registrar of Records, New York City; Dr. F. J. Monaghan, Deputy Commissioner of Health, New York City; Colonel Henry A. Shaw, Medical Department, United States Army; Mr. George H. Van Buren, Supervisor of the Statistical Bureau, Metropolitan Life Insurance Company. Mr. Van Buren attended the Conference as the representative of the American Statistical Association. Dr. Emerson and Mr. Van Buren were the delegates of the American Public Health Association.

Industrial Studies of the Russell Sage Foundation. The Russell Sage Foundation in its Department of Industrial Studies is making a series of investigations of industrial relations, particularly the methods of securing representation of employees. Three studies in the coal industry are now in preparation. These studies have included an inquiry into a plan for representation which is limited to the mines of one company, a study of methods of collective bargaining of the United Mine Workers in the central competitive field, and an analysis of the problems of management which are reflected in the grievances of the miners. Another inquiry in progress deals with the works council of the Rock Island Arsenal. The data gathered have not been primarily statistical, but several interesting statistical problems emerge which relate

not so much to the treatment of material as to the lack of basic data. For instance, we are left in the dark about so vital a subject as the normal number of tons of coal dug by a miner in a day, because although official reports show tons produced and numbers employed, it is impossible in an employment so intermittent as coal mining to derive from this the facts about individual output. In short, the problem is to find the method of measuring "unemployment within employment"—the loss of time within a day even when the mine is in operation and the worker is in attendance. The effect on the earnings of piece workers is obvious. Accurate methods of measuring it would greatly clarify negotiations for new wage scales and would point the way, too, toward possible improvements in management. The difficulty in securing basic data is of course not confined to the coal industry. It suggests the importance of more continuous attention by statisticians to the devising of practical records for current use in industry, which shall reveal the information needed in industrial relations. The investigators who have taken part in these studies are Ben M. Selekman, Edwin S. Smith, Hugh Archbald, and Louis Bloch.

The United States Railroad Labor Board is engaged in working out a comprehensive classification of railroad employees. *Report No. 1 of the Wage Series*, published by the Board, shows the average daily and monthly wage rates of railroad employees on class No. 1 carriers. It is hoped that the classification which the Board is now working on will provide suitable forms upon which roads will report wage data to the Board, and will establish a basis for satisfactory wage statistics for railroad employees. This classification will be ready for adoption by the roads about January 1, 1921.

The National Research Council, with headquarters at Washington, has elected the following chairman of its various divisions for the year beginning July 1, 1920: Division of Foreign Relations, George E. Hale, Director, Mt. Wilson Observatory, Carnegie Institution of Washington; Government Division, Charles D. Walcott, Secretary of the Smithsonian Institution, and President of the National Academy of Sciences; Division of States Relations, John C. Merriam, Professor of Palaeontology, University of California and President-elect of the Carnegie Institution of Washington; Division of Educational Relations, Vernon Kellogg, Professor of Entomology, Stanford University and Permanent Secretary of the National Research Council; Division of Industrial Relations, Harrison E. Howe; Research Information Service, Robert M. Yerkes; Division of Physical Sciences, Augustus Trowbridge, Professor of Physics, Princeton University; Division of Engineering, Comfort A. Adams, Lawrence Professor of Engineering, Harvard University; Division of Chemistry and Chemical Technology, Frederick G. Cottrell, Director of the Bureau of Mines; Division of Geology and Geography, E. B. Mathews, Professor of Minerology and Petrography, Johns Hopkins University; Division of Medical Sciences, George W. McCoy, Director of the U. S. Hygienic Laboratory since 1915; Division of Biology and Agriculture, C. E. McClung, Professor of Zoölogy, University of Pennsylvania; and Division of Anthropology and Psychology, Clark Wissler, Curator of Anthropology, American Museum of Natural History, New York.

Dr. G. B. Roorbach, Professor of Foreign Trade, Harvard Graduate School of Business Administration, was sent by the Boston Chamber of Commerce as a delegate to the organization meeting of the International Chamber of Commerce recently held in Paris. The International Chamber adopted a resolution presented by Dr. Roorbach, stating that "The International Chamber urges that the agencies charged with the collection of commercial statistics take immediate steps to secure a greater degree

of international uniformity in the classification of statistics and the methods of determining the value and the quantity units used in according them." The new method of classifying the exports and imports of this country, which is to be put in effect on January 1, makes this topic of considerable interest at this time.

Mr. Franz Schneider, Jr., has resigned his position as Assistant and Acting Manager of the Research Department of the American International Corporation to become the Financial Editor of the *New York Evening Post.*

Mr. Seldon O. Martin, Manager of the Research Department of the American International Corporation, has spent the last few months in Europe studying the economic situation with special reference to our future trade there. He visited England, France, Italy, Spain, Central Europe, and Scandinavia.

Mr. Mervin E. Lyle, who for some years has been connected with the Columbia Graphophone Company, is now associated with Mr. Willard C. Brinton, President of the Terminal Engineering Company.

Dr. C. J. West has recently accepted a position in the Department of Agriculture at Washington, D. C., as Specialist in Charge of the Division of Marketing Statistics, Bureau of Markets.

Miss Mignonette Uhl, who has been doing statistical and actuarial work at the University of Michigan, is now connected with the Statistical Department of the Metropolitan Life Insurance Company.

Dr. Leonard W. Hatch, who has been Chief Statistician of the Bureau of Statistics in the New York State Industrial Commission, has just resigned to become Manager of the New York State Insurance Fund. Dr. Hatch's place has been filled by the appointment of Dr. Eugene B. Patton who has been Chief of the Division of Special Investigations since 1913 and who has passed the competitive Civil Service examination set to fill the position at the head of the list.

Dr. Leonard P. Ayres of the Russell Sage Foundation has been elected Vice President of the Cleveland Trust Company of Cleveland, Ohio. Dr. Ayres gives up his work as Director of the Department of Education and the Department of Statistics of which he has been in charge since the establishment of the Russell Sage Foundation.

NEW MEMBERS ELECTED SINCE SEPTEMBER 1

Axe, Emerson W., 195 Broadway, New York City. Statistical Department, American Tel. & Tel. Co.

Benton, Carroll, 195 Broadway, New York City. Statistical Department, American Tel. & Tel. Co.

Berridge, William A., Committee on Economic Research, Harvard University, Cambridge, Mass.

Coe, Richard S., 195 Broadway, New York City. Statistical Department, American Tel. & Tel. Co.

Cogswell, Clarence N., Nat'l Aniline & Chemical Co., 21 Burling Slip, New York. Manager, Sales Research Department.

Craig, Ralph C., Statistical Department, Liberty Nat'l. Bank, 120 Broadway, New York City.

Davenport, Charles B., Cold Spring Harbor, Long Island, N. Y. Director, Department of Genetics, Carnegie Institute of Washington.

Dwyer, C. E., Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Emerson, K. B., U. S. Census, Division of Manufactures, Washington, D. C.

Foss, Clarence W., Statistical Department, American Tel. & Tel. Co., 195 Broadway.

Frickey, Edwin, Committee on Economic Research, Harvard University, Cambridge, Mass.

Gottschall, M. Hoke, Department of Internal Affairs, Harrisburg, Pa. Chief, Bureau of Statistics and Information, Department of Internal Affairs.

Hoyt, Homer, Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Ingalls, Walter R., Room 1204, 115 Broadway, New York City. Director, American Bureau of Metal Statistics; Consulting Engineer.

Johnson, William F., Taylor Instrument Co., 95 Ames St., Rochester, N. Y. Employment-attendance records.

Josselyn, M. P., Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Koukol, C. J., Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Lee, Ralph A., The Barrett Co., 17 Battery Place, New York City. Special Engineer, Distillation, Coke and Tar Industry.

Mann, Lawrence B., Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Raibourn, Paul A., Famous Players-Lasky Corp., 485 Fifth Ave., New York. Research work.

Rettig, Hugo V., Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Rice, Willis B., President, Graphic Service Corporation, 154 Nassau St., New York City.

Schaffner, P. A., Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Shaw, Joseph P., Jr., Statistical Department, American Tel. & Tel. Co., 195 Broadway, New York City.

Tait, A. Gordon, Head Office, Royal Bank of Canada, Montreal, Canada. Superintendent of Branches.

Veditz, Charles W. A., National Industrial Conference Board, 10 E. 39th St., New York City. Research work on Board.

REVIEWS

The English Bank Restriction and the Bullion Report of June 8, 1810. Reprinted from Sumner's "*History of American Currency*," with an introduction by Stuyvesant Fish. New York, Henry Holt and Company, 1920. Pp. vii, 136.

Probably no economic happening since the armistice has been the source of such dramatic interest as the fall in our rates of exchange with the various European countries. For a time we heard from all sides that something would have to be done to remedy the situation or else our huge export trade, built up during the war, could not possibly continue. European buyers, it was argued, could not afford to purchase our goods if they were compelled to lay out such unheard of sums of pounds, francs, or lire for United States dollars. Events since the first fall in the exchanges proved the unsoundness of these predictions, for in spite of the continued high price of dollars in terms of European currencies our exports until quite recently showed no decline. In fact the statistics for the fiscal year 1920 show an increase over those for 1919. Even now, however, we come across numerous references to the handicap to our export business caused by the abnormal state of the exchanges. Almost all such predictions are the result of a failure to comprehend the real factors responsible for the present rates of exchange.

When an existing economic condition duplicates the experience of a previous era and that prior experience has been carefully examined and brilliantly analyzed, it is helpful in endeavoring to throw light on present problems to have before us the study made of the events of that earlier age. This accounts for the reprinting at this time of the now classic report of the Bullion Committee of 1810* for an understanding of the conditions that gave rise to that report and of the fundamental principles therein set forth would do much to dissipate the mists that enshroud the present exchange situation in many minds.

In 1797, on account of the drain of gold from the Bank of England, an Order in Council was issued forbidding specie payment until the will of Parliament should be known. Thereafter this restriction was continued by Parliament from time to time so that specie payments were not completely resumed till 1821. For several years prior to the report of the Bullion Committee there had existed a premium on gold in terms of notes of the Bank of England and the exchanges between England and continental points, such as Hamburg, Amsterdam, and Paris, had been adverse to England. The Bullion Committee was appointed to inquire into the causes of these phenomena. The conclusions of the Committee were that both the high price of bullion and the adverse exchanges were the result of the depreciation of the notes of the Bank of England and that this depreciation in turn was caused by the excessive issue of the notes. Resumption of specie payments was recommended by the Committee as the best preventive against the continuation of the excess of bank notes.

The present reprint contains the complete text of the Bullion Report which was included as an appendix to Professor Sumner's *History of American Currency*, published in 1874. The other portion of the reprint is made up of Chapter II of the history and of a brief introduction written by Stuyvesant Fish. In Chapter II Professor Sumner reviews the conditions leading up to the appointment of the Committee, summarizes its findings, and gives a brief account of the parliamentary debates over the report both in 1811 when its conclusions were repudiated and in 1819 when they were overwhelmingly accepted.

* An English reprint of the Report with an introduction by Professor Edwin Cannon was also published in 1919 under the title, *The Paper Pound of 1797–1821.*

In the hearings conducted by the Committee practically all the witnesses insisted that the adverse exchange rates of that day were due to an adverse balance of trade or of payments. This reminds us of the reasons frequently adduced in explanation of the present rates of exchange between the various European countries and the United States. In spite of this testimony, however, the Committee came to the conclusions summarized above.

Mr. Fish in his introduction refers to this experience in English monetary history as a "forgotten incident of vast present moment." Certainly the fundamental reasonings of the Bullion Committee in explanation of the events of that day are very pertinent in any investigation of the present exchange rates. Just as in 1810 the explanation was to be found in the depreciation of the Bank of England note, so today the low value of the currencies of European countries in terms of United States dollars is to be ascribed primarily to the depreciation of those currencies, of which in turn the chief cause is to be found in the excessive issue of paper money in those countries, although the falling off of production is also a factor of importance. The present case is far more extreme than that of 1810, but the underlying principles are the same. Once these principles are grasped, it is seen why Europeans may continue to buy from us in spite of the high cost of dollars. Dollars cost more in pounds, francs, or lire than under normal conditions, but on the other hand, thanks to the enormous issues of paper currency, more pounds, francs, or lire are available to purchase the dollars, and the increased price of dollars is principally a reflection of the decreased value of the foreign currencies in their own countries as indicated by the increased price of commodities in general within those countries. Of course in making statistical comparisons allowance must be made for the decreased purchasing power of the dollar itself. We, too, have had our inflation.

The manner in which exchange rates tend to reflect the comparative purchasing power of various currencies is illustrated by the statistics following:

COMPARISON OF PRICE LEVELS WITH RATES OF EXCHANGE AT NEW YORK
(AVERAGE FOR THE SIX MONTHS, JANUARY–JUNE, 1920)

Country	Index number of wholesale prices* [1913–100]	Exchange rate at New York			Purchasing power of currency as compared with that of U. S., Jan.–June, 1920
		Mint par	Average of monthly high and low rates, January–June, 1920		
			Actual Rate†	Percentage of mint par	
United States	259			100.0	100.0
United Kingdom	303	4.8665‡	3.73	76.6	85.5
Sweden	349	26.80§	20.57	76.7	74.2
France	532	19.30‖	7.33	37.9	48.7
Italy	605	19.30¶	5.56	28.8	42.8

* *Federal Reserve Bulletin*, August, 1920, p. 842
† *Ibid.*, April, 1920, p. 437 and July, 1920, p. 763.
‡ Dollars for £.
§ Dollars for 100 kronor.
‖ Dollars for 100 francs.
¶ Dollars for 100 lire.

The last two columns of the table show the value of the currency of each country as compared with that of the United States, first, as indicated by exchange rates, and second, as indicated by price levels. Thus in 1913 when exchange between the United States and England was about at mint par, the value of the two currencies, taking into consideration the different gold contents of the standard money in the two countries, was approximately equal; but during the first six months of 1920 the value of the currency of England—no longer on a gold standard—was only 76.6 per cent of that of the United States as shown by the rate of exchange.

Again, looking at the question from the viewpoint of internal price levels in the two countries, it is to be noticed that the increase in prices in the United States between 1913 and the first half of 1920 is represented by the change in the index number from 100 to 259; while the increase in the United Kingdom was from 100 to 303. Or stating the proposition in terms of the purchasing power of the two currencies, in the United States the purchasing power in 1920 was $\frac{100}{259}$ of that in 1913, and in the United Kingdom it was $\frac{100}{303}$ of that in 1913. Therefore, if in 1913 the purchasing power of English currency was 100 per cent of that of the United States, in 1920 the former as compared with the latter was $\frac{\frac{100}{303}}{\frac{100}{259}}$ or 85.5 per cent. This equivalence in the value of two currencies as indicated by their comparative purchasing powers has been called by Professor Cassel their "purchasing power parity." Since the breakdown of the gold standard in European countries these purchasing power parities, instead of the old mint pars, constitute the real normal rates of exchange toward which the actual rates will constantly tend. For instance, if the actual rate of exchange in New York on London were to fall much below the purchasing power parity of the currencies in the respective countries, the effect would be to discourage exports from the United States or to encourage imports, which in turn would cause an appreciation of the rate.

The figures in the last two columns show that for the United Kingdom, Sweden, France, and Italy, considerable similarity in results is obtained whether the depreciation of the value of the currencies of those countries as compared with the currency of the United States is measured by means of exchange rates or of price levels. In all cases, however, except that of Sweden, a greater depreciation is indicated by exchange rates than by price levels. In other words, the actual rates of exchange in New York on these countries during the period under consideration showed a depreciation below the purchasing power parities of their currencies with that of the United States. Such an excessive depreciation of the actual exchange rates may be accounted for in part by certain factors mentioned by Professor Cassel, namely, "distrust in the future of a monetary standard, outselling of the money of a country at any price when foreign credits cannot be secured, export of money in order to evade exorbitant taxes at home, etc."

In addition, however, attention must be called to the fact that the index numbers by means of which the comparison of purchasing powers has been made are not altogether satisfactory for the purpose. These index numbers should be based only upon commodities that are the objects of international trade. It is only commodities of this sort that under normal conditions such as existed before the war may be expected to show the same gold prices in different countries, allowing for differences

due to transportation costs and tariff barriers. The numbers used, however, are general index numbers, based upon all kinds of commodities, some of which do not figure in international trade and whose gold prices even under normal conditions might consequently show wide variations in different countries. It may well be the case that the prices of some of these domestic commodities in the United Kingdom, France, and Italy have not increased in the same ratio as the prices of what we may call the international commodities. This would make an index number including such domestic commodities show a smaller increase than would appear if only the international commodities had been used. Under these circumstances, the rate of exchange in New York on London, for example, might be considerably below a purchasing power parity calculated upon the basis of general index numbers without causing any decreased exports from the United States or imports from England, because the international commodities might be just as expensive in England as in the United States, while the comparatively cheap commodities in England might be non-exportable.

In spite of these defects in the index numbers, however, the similarity of the figures in the last two columns is great enough to suggest that the present exchange rates are the result of something more fundamental than a balance of trade or payments, that the real explanation is to be sought in the depreciation of the European currencies as compared with our own currency, and that the principles enunciated by the Bullion Committee are applicable to the present situation. Professor Cassel's theory of purchasing power parities represents a valuable amplication of the theory of the Committee.

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Military and Naval Insurance, June 30, 1919. Bureau of War Risk Insurance, Treasury Department, Government Printing Office, Washington, 1920. Pp. 162.

There has just been issued by the Treasury Department a statistical report compiled by the Actuarial Division of the Bureau of War Risk Insurance under the direction of Mr. William Macfarlane. The document is interesting not only because it is the first official analysis of a large part of our casualties of the World War, but also because it is the first scientific presentation of facts relating to the mortality experienced by one of the most interesting experiments in government insurance which has been tried by any country.

It will be recalled that shortly after we entered the war, the War Risk Insurance Act was amplified in order to accomplish three purposes:

(a) To provide compensation for the soldiers and sailors and their dependents along the lines of the Workmen's Compensation Acts in force for industrial employees throughout the country.

(b) To enable the soldiers and sailors to obtain insurance protection without the payment of the additional war premium which the commercial companies felt compelled to charge in many cases.

(c) To provide a substitute for the pensions which have always followed in the wake of wars in this country and which are proving a financial burden years after the termination of hostilities.*

*In an investigation which the writer made for the government, the results of which are published as Children's Bureau Publication No. 28, Department of Labor, it was pointed out that in 1916 the government was still paying pensions to 709,572 pensioners.

The changes made by Congress in the act as drawn may serve to prevent its being a satisfactory substitute for pensions, but notwithstanding errors of administration and regrettable errors in system, the act accomplished the purposes set out in (a) and (b).

It was fortunate for the Bureau that its actuarial work was supervised by so capable a statistician as Mr. Macfarlane and although much of the matter presented in the report under review was probably prepared after he had left the Bureau, he is doubtless entitled to credit for the orderly presentation of facts which will prove of use in the future.

It is to be regretted, however, that nowhere in the report appears any statement of the amounts of insurance issued at the various ages or the duration of the policies. These facts are vital to a proper consideration of the mortality by actuaries, for without them no proper idea of the exposure can be obtained. We are unable, therefore, to make a comparison between the actual and the expected mortality. Life insurance students would likewise be interested in studying the persistency of the business, no data for which appear in the report. While some of these facts may have been contained in fragmentary announcements from the Bureau, the necessity for bringing them together with a statement of the mortality experienced is apparent.

Throughout the report the lack of weighted averages is noted. Although it is interesting to know that there were 77,814 privates involved in death and disability cases under contract and automatic insurance and that there were only 54 colonels, much valuable information is lost by the failure to include a statement of the mean number exposed in each rank. Nowhere in the report is there any attempt to supply these aids to valuable comparisons.

Future users of this report should bear in mind that the insurance death group will represent only a fraction—about 90 per cent it is stated—of the total deaths due to service, for all men who were killed were not insured; the compensation death group does not supply this deficiency because compensation is payable only to beneficiaries within a limited permitted class and in addition to this, such beneficiaries, when they do come in within the limits of that class must, with the exception of wives and children, prove dependency before they are entitled to an award.

An ideal arrangement would be a joint publication by the Adjutant General's Department and the Bureau of War Risk Insurance. This would enable the statistics of the actual mortality experienced by our fighting force to be used to advantage.

The pamphlet must be studied as a whole, but some of the interesting facts (although trivial in some cases) are indicated hereafter. In Table IV, showing the age of the insured and the date of death or the date of disability, it is interesting to note the preponderance of deaths between the ages of 20 and 32. It is pointed out that the average age of the 104,485 who died was 25 years and 4 months, the median age was 24 years and 8 months and the modal age about 23 years. These statistics of course cannot be compared with those of any other country engaged in the war, for our participation required the use of those who were called to the colors by the first draft only. As the largest part of our army, therefore, was called between the ages of 20 and 30, it is but natural to expect that the point of maximum incidence of mortality should be low.

The relationship of the beneficiaries to the insured will prove less interesting to the statistician than it will to the legislator in the future and to the student of ethics. Table V shows that in the 99,625 death cases under contract insurance, the mother was named as beneficiary in 46,375 policies or over 46 per cent, and in 17,640 cases the father was the beneficiary. In nearly 65 per cent of the death cases, therefore,

the father or the mother had been selected as the beneficiary, a fact which is both an indication of the unmarried condition of our armed forces and also a tribute to their filial devotion.

Table VI is of particular interest to insurance offices, for in it the death and disability losses are grouped by policy amounts. Of the 100,070 cases involved, 84,155 were $10,000 cases. As the 100,070 cases covered insurance amounting to $919,339,380, it will be seen that the average policy is well over $9,000. In pre-war days, the average death loss of insurance offices was between $2,000 and $3,000, and it is interesting to note that the war or the War Risk Insurance Act or both may be responsible for the fact that the average amount of the insurance policy issued today by commercial companies is very much higher than before the war. Quite unconsciously, perhaps, the government has increased the average, and soliciting agents have not been slow to avail themselves of the psychological effect induced thereby.

The effect of the influenza epidemic on mortality is indicated by the fact that while from October, 1917, to June, 1919 there were 105,050 deaths, during October, 1918, 42,871 deaths occurred, and during September, October, and November, 1918, 67,319 deaths occurred. This same situation is reflected in the table analyzing the deaths by causes, for 18,448 died from influenza and pneumonia and 27,234 from pneumonia and empyema. Of these deaths, 74 per cent of the combined influenza and pneumonia deaths occurred during the epidemic which for statistical purposes is considered as having existed during September, October, and November, 1918, only. The complete list of traumatisms and diseases which caused the deaths and disabilities is illuminating. Bearing in mind that the total deaths and disabilities insured under contract or automatic insurance were 105,050, it will doubtless surprise many to learn that 41,132 were killed in action or died as a result of their wounds received in action; the control which the medical corps exercised over preventable diseases is illustrated by the fact that only 209 deaths are ascribable to typhoid fever and 67 to syphilis; tuberculosis is subdivided as follows:

Tuberculosis, meningitis	72
Tuberculosis, lungs	1,397
Tuberculosis, all other (except Pott's disease)	212
Pott's disease	1

Of all diseases of the respiratory system, only 2.04 per cent can be ascribed to pulmonary tuberculosis. Advocates of the prohibition movement can find little material for argument in the number of deaths traceable to alcoholism, the statistics being as follows:

In the Army		*In the Navy*	
Privates	38	Seamen	3
Corporals	3	Petty officer	1
Sergeants	2		
Captain	1		
Lieutenant-Colonel	1		

Surely this is a record of an exceedingly moral fighting force.

Fifty-eight per cent of the deaths covered by contract insurance occurred in France in which country 40,142 were either killed in action or died from wounds received in action. As the total deaths in all countries ascribable to that cause were only 41,062, the point of fighting intensity is apparent. In the analysis of deaths by countries, it is interesting to note that two deaths from excessive cold occurred in the United

States, one in the British Isles and one at sea. None, however, is charged to North Russia and Siberia.

In the early part of this review regret is expressed that no statistics as to the total insurance were published. On page 115 of the pamphlet, the Bureau states that owing to the constant lapsing and reinstatements, it is impossible to make any statement regarding the liabilities of the government for this fluctuating body of policyholders. It is believed that in general actuaries will be disinclined to admit the inability of the government to calculate its liabilities in this important development and that in the near future a valuation of this kind should be attempted.

All of the foregoing refers to the claims under insurance contracts. The part of the report dealing with claims for compensation benefits is interesting, but the exposure is too meager to permit many valuable deductions to be made. Between October 6, 1917, and June 30, 1919, 243,660 claims for compensation were received on which awards were made for only 58,127; 66,283 were disallowed and the balance, 119,250, or about one-half of the claims received, were reported as "pending." Nearly all of these marked "pending" are claims concerning which more information is required in the form of certificates, affidavits, etc., and the small number of settled cases prevents the publication from being of much interest for statistical purposes.

In view of the experience with insurance policies, one might question the correctness of the statement that of the total number of claims—58,127—only 5,899 have been caused by influenza and pneumonia. The explanation, however, lies in the fact that these claims cover not only death but also disability, and of all claims arising from disability, less than 1 per cent can be ascribed to influenza and less than 2 per cent to pneumonia.

S. H. WOLFE.

Census of Religious Bodies, 1916. Bureau of the Census. Part I, Summary and General Tables (594 pages). Part II, Separate Denominations: History, Description, and Statistics (727 pages).

"This report was prepared under the provisions of the permanent census act, approved March 6, 1902, as amended by the act of June 7, 1906. Its purpose is to present statistics of the number of organizations, members, etc., of the different religious denominations of the country, and to give in addition a review of their historical origin and development, their doctrine, policy, and their missionary, educational, and philanthropic activities. The statistics relate as near as may be to the close of the calendar year 1916, and were collected for each local church organization."*

The appearance of another Census of Religious Bodies is always of interest to sociologists and other students of religious groups in the United States. Beginning as a small and not very efficiently managed part of the censuses of 1850, 1860, and 1870, this inquiry first assumed importance in 1890 when the questions asked were as follows: organizations, church edifices, and seating capacities; halls, school houses, etc., and seating capacity; value of church property; and communicants or members. A statement was added of the number of ministers in each denomination as a whole. The census of 1906 added certain new inquiries: the year of establishment (local church organization); amount of debt on church property, number and value of church parsonages; language in which services are conducted; salaries paid to ministers; sex of communicants or members; and the number and membership of Sunday schools conducted by church organizations.

The census of 1916 has somewhat widened the scope of this type of study, principally by separating and expanding the inquiry about ministers; by asking about other

*Part I, p. 11.

buildings used for church work; expenditures of church during preceding year; the sex and church membership of Sunday school scholars; and the number of church members under 13 years of age. The questionnaire about ministers is so explicit that it seems worth while to include it here:

1. Name of minister, priest, or rabbi.
2. Denominational connection.
3. Location.
4. Name, location, and denomination of the churches which you are now serving.
5. State whether pastor, associate or assistant pastor, supply, emeritus, retired, etc.
6. Total amount of salary received during the past year for church service.
7. If in other than pastoral or preaching service, state occupation, and position.
8. Date of ordination.
9. Date of entrance on present pastorate.
10. Age at last birthday.
11. State whether graduate of college or of theological school.

The data of this report were gathered mainly by correspondence with the local church organizations, generally through the pastor or clerk, the list of church organizations having been gathered from year books, etc., of the respective denominations. Special agents collected statistics for sixty-eight denominations and in ten cases a combination of special agent and correspondence was employed. It is noteworthy that 62.7 per cent of the 227,487 schedules were secured through correspondence alone, 30 per cent through correspondence and the work of special agents, and 7.3 per cent through agents alone. The statistics of ministers were secured by direct correspondence with them. Undenominational and union Sunday schools were reported by the International Sunday School Association; figures of church activities were obtained by correspondence and from printed reports; and the historical and doctrinal summaries of Part II were passed upon by responsible members of the several sects.

A valuable feature, first introduced in this census, is the inquiry as to members under and over 13 years of age. The noticeable variability displayed in the matter of juvenile membership is only one of the evidences of the individualistic tendencies of American life, whether regarded in the secular or in the sacred fields. Of the total number of members 87.2 per cent are 13 years of age or over. This fact should be kept in mind in estimating the potential value of the church as an effective medium of opinion or factor in reform.

These two volumes are a mine of examples to "point a moral," at least, if not to "adorn a tale." Not the least interesting is the fact that in the period 1906–16, there was a net increase of fourteen denominations; in 1890–1906, a net increase of forty-one. In the later period fourteen new denominations appear to have sprung up, and in the earlier, no less than forty-eight, not including those added by an amoeba-like proliferation. Do these facts mean that our period of standardization in religion is approaching? Do they indicate that geographical isolation is decreasing, and with it mental isolation and exclusiveness?

In a similar way the figures show that the number of church organizations increased very much less rapidly in the period 1906–16 than in the period 1890–1906, the percentages being 7.2 and 28.5 respectively. The expansive tendencies of the nineties are counter-balanced by the concentrative policy which conditions have forced on many denominations, or which the modern tendencies to coöperate and to avoid duplication have produced.

Membership, however, has increased slightly more rapidly than the number of or-

ganizations. For the total period 1890–1916, the membership rose from 21,699,432 to 41,926,854, a gain of 93.2 per cent. From 1890–1906 the increase was 13,368,626, or 61.6 per cent; while from 1906–1916 the increase was 6,858,796, or 19.6 per cent. The increases in the case of individual churches are found in some cases to follow the same trend. For example, the Roman Catholic Church gained 114.1 per cent in twenty-six years, 93.5 per cent in the first period, and 10.6 per cent in the second. Its proportion of all church membership being at the three censuses 33.8 per cent (1890), 40.5 per cent (1906), and 37.5 per cent (1916), it is obvious that the rate of general change is partly conditioned by the trend of this one widely distributed church. Many reports of individual denominations are, however, vitiated by lack of clarity in the original definition of "member"; the Jewish congregations suffer by comparison here.

The question of the sex distribution of members is of special interest at this time. There is no doubt that most denominations could be gynocracies, provided the female members could (and would) seize the reins and rule by majority power. Of the total reported in this connection (about 36,000,000), 56.1 per cent were female. A slight change from the figure of 1906 (56.5 per cent) is here to be noted.

The crucial factor in any church is the clergy thereof. They at once represent the church and guide it. Facts concerning the quality of the rank and file of the membership being unavailable, we look to the discussion of the ministry to throw light on the the church. In all, 191,796 ministers were reported. Of these, 100,793 returned schedules, 95,702 giving fairly complete details.

The first table to strike the attention is that of classification of ministers in church work. There are engaged in pastoral work 80,435. Of these, 64,899 are in pastoral work only—67.8 per cent of all reporting; 6,735 are pastors with other occupations. Of the 15,267 not in pastoral work, the "retired" are 6,702, the others being in denominational, educational, or evangelistic work, or in other occupations.

So much attention is being paid to salaries in these days of rising costs of living that it is important to note that "in only thirty-one of the 104 denominations with five or more ministers who reported salaries was the average salary over $1,000, leaving seventy-three in which it was less than that amount. Specifically, the average salary for these thirty-one denominations was $1,278, while the average salary for the seventy-three denominations was $738. The pastors in these thirty-one denominations numbered 39,970, or 62.9 per cent of all the pastors reporting full salaries, while the lower average salary was reported by 23,573 pastors or 37.1 per cent."* These salary deficiencies are only partially mitigated by free parsonages and retiring allowances, both of which are on the increase.

The statistics of languages used in services cast some light on the value of a *laissez faire* policy in reducing the adherence of foreign groups to their respective native tongues. Giving the approximate percentages for 1906 and 1916 we have:

Using a Foreign Language

1906	1916
11.6 per cent of organizations	11.5 per cent of organizations
26.6 per cent of members	27.0 per cent of members

Using Only a Foreign Language

1906	1916
67.9 per cent of all organizations using any foreign language at all	44.6 per cent of all organizations using any foreign language at all

*Part I, p. 73.

It is evident that the English language was making great inroads upon the exclusive use of a foreign tongue long before it was found necessary to ban one of the principal languages spoken by the foreign-born of our country. The natural influences were succeeding in producing an effect which will be interesting to compare with that of the more robust methods of 1917 and beyond.

A section of the report that is of great significance is that upon the "Work of Denominations in Domestic and Foreign Fields." It shows in a very concrete fashion how largely the religious bodies of today maintain their activity in fields that have been to a large degree secularized. The data for this part of the report were secured from the general church organizations, not from the local units. The range of information afforded by this section is indicated by the list of subjects treated: in the domestic field, contributions, number of home missionaries, number of higher schools, philanthropic institutions and their beneficiaries, value of property and endowments held for educational and philanthropic uses. Similar information is given regarding the work of the churches in foreign countries.

The reader of this report is likely to be disappointed in one respect, however. The schedules sent to the local church organizations and those sent to the ministers were not completely utilized. For example, in the schedule for churches the date of organization of the local church is asked for, yet no report is given on this topic. The summary of these answers would be very valuable in showing the periods in which church expansion was most rapid; it would offer a sort of record of church natality. In the case of the schedules sent to the ministers similar omissions of treatment have occurred. The questions not dealt with are: date of ordination; date of entrance upon present pastorate; age at last birthday; statement of graduation from college or theological school. (Incidentally, why should not a minister have graduated from both types of educational institutions? Many of them have done so.) A statistical summary of each one of the above named inquiries regarding the individual clergyman would have been valuable. In studying a professional group one is interested in the length of time its members have been practicing the profession. The "labor turnover" of the local church would be measured roughly by the average length of time served at the present position. Whether the clergy are being recruited at a normal rate from each generation would be shown by a study of their age distribution. And certainly the partisan as well as the critic is entitled to know what the educational qualifications of the ministry are. It would be very pleasing to have at least a brief supplementary report published by the Bureau of the Census covering these omitted items in the questionnaire.

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Statistics of Income. Compiled from the returns for 1917 under the direction of the Commissioner of Internal Revenue, Washington, 1919.

For the purposes of a review of such a report as this, three general questions may perhaps be distinguished as of primary interest: (1) Is the statistical material adequately exploited with reference to setting forth what is of greatest interest? (a) Are the tables and text, as to form and content, what the critical statistician would expect? (3) Are there weaknesses in the data of a nature to impair their usefulness or make it necessary to qualify indicated conclusions?

(1) The reviewer's judgment—which of course is not so good as that of one who has attempted to make actual use of the data—is that the original material has, within certain limits, been adequately exploited in the published tables.

One suggestion seems called for. The size classification for personal returns is by $1,000 steps up to $15,000 (with a $2,500 stage intervening); then by $5,000 steps to $30,000; then by $10,000 steps to $100,000; then by $50,000 steps to $300,000; then by $100,000 steps to $500,000. Then occurs stages of $750,000, $1,000,000 and $1,500,000. And finally the size classes are by even millions up to $5,000,000 and over. The reference is especially to Table II. The classification is condensed in some cases, but appears in the state tables as well as in those for the United States as a whole. The stages might be made to come more consistently at regular geometrical intervals, but the arrangement is not bad. The writer's suggestion is that a more detailed classification would be desirable, though only for the United States as a whole, and perhaps only for net income. Steps of $500 would not be too fine for a large part of the scale, and the smallness of the number of returns in many of such classes should not prevent employing for the country as a whole the finer subdivision. It is to be presumed that the work of compilation was done by means of perforated cards, hence such a table would involve little additional expense.

Since income received from corporations, though deducted for tax purposes, is included in personal returns, the completeness of the report is not, for general purposes, directly affected by the limited space given to corporate data. A separate report on corporate income statistics, as a matter of further compilation, is an important desideratum. The need is not adequately met by the report on "Corporate Earnings and Government Revenues," issued by the Treasury Department as of July 5, 1918, and relating to some 60 per cent of the corporations reporting over 15 per cent earned on their stock in 1917.

(2) Very little space is devoted to text and derivative tables, 19 pages out of the 133 contained in the report being so used. This is appropriate at least as regards emphasis. It would seem, however, that, by way of interpretation, the Income Tax Law and Regulations, as a controlling factor in determining the character of the available data and the form their presentation must take, should be explained in proper relation to the figures. It is true that it is easy to find such information elsewhere, and indeed most readers will have had some little practical experience with the basic schedules and with the questions of classification and definition involved. Under the circumstances, explanatory text of the nature indicated need not be considered absolutely essential.

(3) Some attention might well have been given to the consistency of the compiled data with other sorts of available statistical information. All possible tests of correctness should be applied, not merely on grounds of scientific interest, but also for fiscal reasons. Much of what is desirable in this connection can be achieved by comparison of figures for successive years. The 1916 figures are obviously not directly or entirely comparable with those for 1917. Doubtless more time is necessary for the suggested comparisons and tests. The considerations mentioned are not a direct answer to the third question stated above; and perhaps it is in the nature of the question that it cannot as yet be answered except in a very limited way.

There is an inconsistency between Tables III and X on income classes between $150,000 and $400,000.

With regard to the intrinsic interest and analytical possibilities of the material presented, nothing more than scattered hints should be expected of a reviewer. Moreover, the most fruitful analytical possibilities must await until similar data for a series of years are available.

It is now possible to determine the conformation of the curve of income distribution in the United States with a high degree of definiteness. Comparisons between the states in this respect also suggest themselves.

For moderate and large-sized incomes, information as to their composition as between service income and property income is now available for the statistical student. He will find need for the exercise of considerable acumen in splitting business incomes between services and property.

That the ratio of income from property to total included income increases as the size of incomes increases is an obvious fact that statistics can merely make numerically precise. As a corollary from this fact and with the aid of assumptions with regard to the element of reward for personal services among incomes of very large size, it may be inferred that the number of millionaires in the United States is not much smaller than the number of persons with incomes of $60,000 a year or more, or in 1917 not much fewer than 14,562. At $60,000 the proportion of income from personal services and business is about one-third of the total (p. 14). The share of the State of New York in the above stated number of incomes of $60,000 or more is 4,793 (pp. 48–50).

The data of corporate returns offer a variety of statistical difficulties and possibilities that should attract the analytical student, although for the student of corporate earnings and business conditions the data presented will not be sufficient. Some information is found in the report under review regarding income of Americans from foreign investments and vice versa. Details by kinds of industry from which corporation incomes are derived are presented and should afford much material of statistical interest. It is scarcely necessary to mention the great extent to which the presentation of data separately by states is carried, as this is to be expected in United States Government reports.

This document devoted to statistics of income is the initial report of its kind. It should be the first of a regular series of such reports and the fiscal as well as the public interest in statistics of this nature warrant any reasonable extension of the scope of the compilation and analysis. Fiscal and practical interests do not preclude but are rather dependent upon the presentation of the facts that are of interest to the scientific statistician.

G. P. WATKINS.

Business Research and Statistics. By J. George Frederick. New York, D. Appleton & Co., 1920. Pp. 333.

Mr. Frederick's aim, as stated in the preface of his book, is both to direct the attention of business executives to the value of business research and to correct the "narrow, circumscribed and uncreative attitude" of the average research worker or statistician, "unacquainted with practical business aim and necessity." The author has added a new set of classifications of statisticians, namely, statisticians, hack statisticians, and business research statisticians who are only "partly professional," being more concerned in advancing the fortunes of their business than winning fame among their professional colleagues.

The book makes no contribution to method in business research, confining itself almost entirely to an enumeration of questions and problems to which business research should address itself, and to the discussion of their practical value. At first glance, therefore, one would say that statisticians would derive little benefit from its perusal. There are, however, several features of the book that are worthy of attention by professional statisticians.

In the first place, the book indicates the development taking place in the field of commercial research under private auspices, which is a matter of considerable significance. The professional statistician, to use the author's phrase, is probably unaware of the nature and extent of this research work which has come about in response to a specific need on the part of business organizations. As the author repeatedly states,

such business research deals with specific questions raised by the practice of the business technique and is emphatically practical, being concerned with finding answers to those questions. Its utilitarian character may incline some persons to dismiss it as a mere application of statistical method to money-making and therefore of little scientific value. But such a dismissal would be to ignore several exceedingly important facts which should not be neglected. Either this business research will continue to be only "partly professional," or it will develop into a scientific inquiry into business methods and activities. If ever it is to become scientific, the professional statisticians must turn their attention to it and by criticism and the development of better methods make it so. And when regarded properly, it is impossible to see how they can fail to devote more time and consideration to business research, for it is through such business research that the approach must be made to many economic studies. The data for these studies are collectible only through business organizations and trade associations, since business men will not coöperate with public or academic agencies of study (unless they see some benefit to be derived therefrom), but work with their own agencies. Also, the financing of these economic studies is possible now only through business organizations.

Furthermore, the character of the data being and to be collected for business research is such that the professional statistician cannot afford to neglect this field. Sooner or later the trained statistician will have to concern himself with the larger aspects, at least, of the question raised by the practice of the business technique. For what the business man is seeking is to control economic activities and he demands of business research the answers to the questions of how to do it. Although this interest in research may appear as just money getting, yet in reality the research is more than that: it is an attempt to exercise direction and control over economic affairs through the use of intelligence, an enterprise which must command the allegiance of every statistician who is not wholly blinded by the traditional formulae of economic theory. Even if the professional statistician questions the self-interest of the business man in commercial research, he cannot remain indifferent to the questions it addresses. The questions of demand and its variations, of prices and their fluctuations, of production and distribution are all relevant to the statistical economist. And it cannot be too often emphasized that progress in science has been more rapid when attempts were made to solve specific problems than when complete theoretical structures have been sought.

For the economist the book is of interest since it discusses a variety of questions on or beyond the "frontier of economic theory," questions concerning economic activity which are entirely ignored by the text-books of economics. Until economic theory, predicated upon the concept of a free play of economic forces, reconciles the existence of the large measure of control exercised by business men with its free play of forces, its analysis must be deficient.

Therefore, it is safe to say that although technically the book makes no contribution to statistics as such, it offers a challenge to both statisticians and economists. It is full of inconsistencies, many of which are amusing. For example, in speaking of the labor problem, the author remarks that "business research, *unbound by economic theory*, and trained to think of facts as they are today, would unquestionably have uncovered this grave error long ago (of regarding labor as a commodity)." Yet in discussing the development of manufacturing by wholesalers and jobbers (instead of sticking to their function of distributing only), the author speaks of this as a "cancer spot in the distributive situation today," implying that it is contrary to economic theory and therefore unsound for a wholesale business to develop its own source of supply. Again he says, "the tendency of the larger (distributive) units to

cut prices (because they can afford it through securing quantity prices) is a highly unfair and uneconomic proceeding," implying that economic proceedings must favor the smaller unit, probably in order to preserve the competition and the individual initiative dear to the economist's heart.

Also, the author's insistence upon the advisability of having business research done by outside agencies instead of by a private staff in the business implies that scientific work cannot be done by the private staff, which is absurd when one considers the number of chemists, physicists, and engineers now attached to business. It appears too much like a sales argument, other examples of which mar the book.

On the whole the book is more for the business man than for the professional statistician who will, nevertheless, find it valuable as serving to acquaint him with the character of the problems business is studying today, about which he must sooner or later know more than he does.

LAWRENCE K. FRANK.

New York City.

Budgets of Families and Individuals of Kensington, Philadelphia. By Esther Louise Little, A.M., and William Joseph Henry Cotton, A.M. A thesis for the Degree of Doctor of Philosophy at the University of Pennsylvania. Lancaster, Pa. The New Era Printing Co., 1920. Pp. 273.

Since the cost-of-living investigations made by Engels, it has been customary to classify such studies as extensive or intensive, according to the number of cases included. Whether or not such a differentiation is now justifiable, this report will be classed as an intensive study, as it includes only 34 budgets of which 23 are of families, 9 are of unmarried women, and 2 are of unmarried men. The budgets are from actual records kept day by day for a year or a large part of a year, during 1913 and 1914, that is, just before the beginning of the recent upheaval in prices. The investigation also includes a study of incomes, and standard budgets are drawn up for textile-mill workers which the authors designate as a "fair standard of living," the descriptive title thus varying from other such designations as the "minimum-of-subsistence budget" or the "health-and-decency budget."

The study of only a few cases has the advantage of enabling the investigators to know them well. This knowledge the authors have achieved and the basic material is presented in considerable detail, both in summaries and in family histories. The presentation is interesting to read. The accounts are very human. The lists of expenditures for clothing by items, for instance, make a vivid impression. An excellent feature is the showing of the amount of income week by week in curves for each individual. These curves are by no means smooth and the frequent deep downward slopes from the rather low level seem to have almost terrible significance. The details of some of the miscellaneous expenditures are very welcome, as this part of the budget is frequently neglected. The general pattern of the study is somewhat like those of the well-known investigations of Chapin and of More. And it is important to have a few more carefully kept records to add to the not too large existing stock.

Although the fulness of the exposition of the original data is admirable, there are some shortcomings in certain aspects of method. The intensive study of a few cases is often praised for the accuracy attained, but it also presents abundant opportunities for making improvements in method and for obtaining information difficult to obtain when a larger number of cases are studied less thoroughly. Have the authors utilized

these opportunities? And have they made any contributions to the development of the technique of cost-of-living studies? In reference to these questions the following comments are made.

The importance of food expenditures in the budget is admittedly great. The food should be listed in quantities and a chemical analysis should be made, showing not only calories but the various constituents. This the authors have not done, although the technique for such a procedure has been well worked out and it could have been done for these few families without much effort. Instead the authors price in Philadelphia one standard dietary worked out for Fall River, Mass., and make comparison with the food expenditures of the particular families. Food is the pivotal point in determining the subsistence budget. It is of greatest value for health and for the growth of children. It is very important that adequate analysis should be made of food consummation.

The great need in studies of standards of living is not so much estimates in prices as in quantities, and qualitative descriptions. For instance, such a quantity budget is intelligible at all times, while a price budget is difficult to understand with the shifting of general and special prices that take place. The thing that tells us what the standard is is the quantity and quality of the items and not the prices, though in some cases prices give a rough indication. This point is particularly applicable to this study made in 1913–14 and published five years later after prices had changed radically. With the small number of families, the authors might have presented more of their estimates in quantities and descriptions.

It would have been feasible, also, to make a more intensive study of fuel than was done. It is desirable to know the fuel consumed expressed in the British Thermal Units in relation to temperatures, kinds of houses, and types of heating apparatus. Such information regarding the relation of fuel to such varying factors was needed, for instance, by the Fuel Administration during the war. Such information would help in determining objectively fuel needs.

In summarizing the data the authors might have made improvements, and indeed should have avoided some defects. In the first place, twenty-three families are almost too few cases to summarize; they form too small a sample to be of much statistical significance. Furthermore, the constitution of these families is so varied that it is difficult to make comparisons. For instance, a family with boarders and lodgers is not the same sort of unit as a family with only husband, wife, and children. If the selection of cases had been made on the basis of a more rigidly defined unit, the results would have been more amenable to statistical treatment. Indeed, it appears that the authors are guilty of sins of commission as well as omission in such a case as the following. Family number 22, which includes a man, boarder and lodger, spent $338 for food which includes the cost of the food the boarder ate, and $36.40 for clothing which does not include the cost of the boarder's clothing. This is all right. But in reckoning the total expenditures of the family, the cost of the boarder's food is added in but not the cost of his clothing. The question is: What is the size of the family whose total expenditure is $555.20? Furthermore, the percentages of expenditure for various classes of items are computed. Thus 60.88 per cent goes for food including the boarder and 6.56 per cent goes for clothing not including the boarder. Now a per cent is a part of a whole, but what is the whole? Is it the expenditure of a family of three individuals or of four? Percentages are supposed to facilitate comparisons, and in the adjoining column of the table referred to another family spends 40.14 per cent of the total expenditure for food; but the family that spends 60.88 per cent has a boarder. What does the percentage comparison mean?

In Chapters II and IV the investigators set forth a standard budget, calling it a "fair standard." The setting of a standard is more difficult than recording what families actually spend, because it involves values and is peculiarly liable to subjective influences. It is interesting to know that the authors set $1,069.94 as the yearly expenditure at a fair standard of living for a textile-mill worker's family of five, consisting of father, mother, a girl of 10, a boy of 6, and a boy of 4 in 1913–14 in Kensington, Philadelphia. But one wishes to know the objective basis for calling it a "fair standard" and an account of what a "fair standard" is in some terms other than the classes of items. There are any number of standards of living. They could be plotted in a series. But why is a particular one singled out and called a fair one? A listing of concrete items does not make it a "fair" one. It might be "fair" to the authors but not to the reader or to some other investigator. There should be some objective tests upon which there would be common agreement, as when we say the temperature of a room should be kept in winter at 68 degrees Fahrenheit. The reader feels a certain confidence in the authors' standard because he sees that the authors are very familiar with the life of the community. But this is not an objective basis. It is certainly too much to expect at the present stage of the evolution of budget studies to arrive at a thoroughly objective standard, and the authors should not be particularly criticized for this failure since no investigator, so far as the reviewer knows, has made much of a success in setting such objective tests for a standard budget. But such a step in the evolution of budget studies is very much to be desired.

In summary it may be said that this study of family budgets furnishes a great deal of very satisfactory detail and that it is a welcome addition of apparently carefully collected data; but its presentation is not particularly expert, nor does there seem to be any significant contribution to methods not already well known and in use at that time.

WILLIAM F. OGBURN.

Official Yearbook of the Commonwealth of Australia. Statistics for Period 1901 to 1918, No. 12, 1919. Prepared by G. H. Knibbs, Commonwealth Statistician.

Australia's official yearbook is a statistical institution with which the members of this association are familiar. The issuance of the most recent volume bringing the statistics up to 1918, however, affords an opportunity for a brief notice. A general survey of the subjects covered in the yearbook makes one envious of the possibility of canvassing so vast a field in one volume, even though it be a volume of 1,234 pages. The volume, furthermore, is not confined to statistics, but contains a large amount of data on all phases of economic and social life of Australia. Continuity between the volumes for successive years is maintained by publishing every year special articles on various topics and printing in each issue a list of the previous articles with references. Consequently the possession of the latest volume of the yearbook enables the reader to obtain all the statistical data about Australia and gives him in addition a valuable list of references on the topics discussed in previous years.

One reason for Mr. Knibbs' ability to cover so many phases of Australian life in the compass of one volume is brought out by the population map which emphasizes the familiar fact that only the southwestern portion of the continent is at all thickly inhabited, so that the area to be covered is much smaller than the continent. It is of interest that the total population of Australia in 1918 was only slightly over 5 millions and that about 96 per cent of that population were natives of Australia or the United Kingdom, while the total proportion of persons of non-European origin was less than 1 per cent. The great contrast in this respect between the United States and Australia

impresses an American statistician. Having always controlled immigration and encouraged only arrivals from the home country and of similar stock, Australia has preserved a homogeneity unequaled by any other colonial territory. Australia is not only a white man's country but a Britisher's country, and this fact has had a decided influence on her institutions and economic development.

The volume contains an excellent map of Australia prepared with the assistance of the commonwealth meteorologist. Many interesting charts are also included in the yearbook. A chart on page 140 shows the growth of the population in Australia, separately for each sex, from 1860 to 1918, as compared with the rate of increase in the United States from 1790 to 1860. Presumably this rate of increase for the United States is chosen as representing approximately the period of development through which Australia is now going. It is of interest that up to 1895 the Australian rate for males was similar to the United States rate, but since that date it has been falling very far behind. On the other hand, in the case of the females the Australian rate did not fall behind the United States rate until 1914, and it is still not very far behind. This increase in the female population reflects the change from a pioneer country to a settled country. As a matter of fact, Australia contains now more women than men, the excess of women being about 1.67 per cent. In 1859 Australia's population was a little over one million and in 1918 it was about five millions, the greatest increase occurring during the first thirty years of settlement. Maximum immigration is recorded during the five-year period 1881–85, at which time it reached 224,000. Since that time it has been on a decline; for the five years 1911–15 the number was 100,000; for the period 1916–18, however, owing to the departure of many Australians to the battlefields, a net loss through emigration of 136,000 is shown. The total increase through immigration from 1861 to 1918 is 770,000.

Australia's deliberate policy of maintaining racial unity at the cost of slower development is the outstanding fact in a survey of its statistical record.

E. A. Goldenweiser.

Special Tables of Mortality from Influenza in Indiana, Kansas, and Philadelphia, Pa., September 1–December 1, 1918. Department of Commerce, Bureau of Census, Government Printing Office, 1920. Pp. 181.

These tables, which were prepared under the supervision of Dr. William H. Davis, Chief Statistician for Vital Statistics, and with the coöperation of the United States Public Health Service, constitute an important body of material for statistical analysis of mortality caused by the pandemic of influenza in the United States in the latter part of 1918. The detail in which the special tabulations were made was the result of numerous conferences on the part of an inter-departmental board representing the medical and statistical offices of the Army, Navy, and Public Health Service, and of suggestions from others who are interested in the epidemiology of the disease. It is the most voluminous and detailed mass of mortality data on this subject that has been made available at any one time in this country.

The chief value of the tables lies in the material which they afford for analysis. No attempt has been made in the bulletin to present analyses of the data, with the exception of a few summary tables and graphs showing the mortality rate among persons of different ages and sexes in certain larger cities in Indiana and Kansas, and in Philadelphia, for the two states as a whole, and for rural portions of the two states. The fact that the population estimates according to age, sex, occupation, and geographic division, as well as for other groups and classes of population, were of doubt-

ful value, rendered any attempt at detailed or refined analyses impracticable. The population estimates for 1918, as is well known, are uncertain because they were too far away from the preceding census. The serious disarrangement of the ordinary distributions of population according to sex, age, occupational, and other groupings caused by the unusual conditions prevailing during the war was another factor which undoubtedly accounts for the absence of more detailed analyses of the data presented. To some extent these handicaps have been overcome by using the proportionate mortality method; but for obvious reasons the results are not so satisfactory as could be desired.

The bulletin, therefore, will become more valuable as soon as the final figures are announced for the census of 1920. Then more dependable estimates of the various population groups can be made and the material can be used in more detailed as well as more accurate ways.

The value of the bulletin lies in the raw material which it offers for statistical analysis. The deaths from influenza and pneumonia are given in considerable detail according to age, sex, occupation, month of occurrence and broad occupational groups. It creates an excellent precedent for the publication of special bulletins giving in sufficient detail for statistical analysis the number of deaths from epidemic and other important causes. For more than one reason, therefore, it is an important contribution to a statistical literature.

EDGAR SYDENSTRICKER.

United States Public Health Service.

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